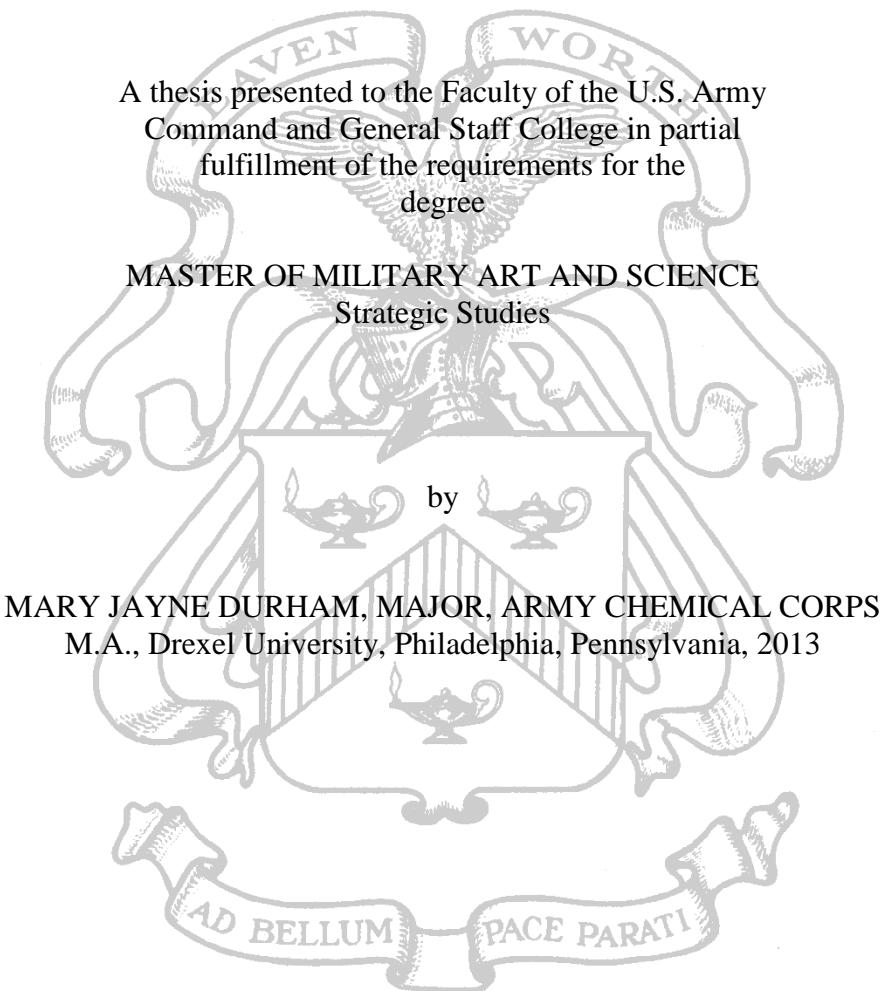


WEEKEND WARRIORS FOR WATER:  
COMBATING WATER SCARCITY IN WEST AFRICA WITH UNITED STATES  
ARMY NATIONAL GUARD AND RESERVE FORCES



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2017

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

### **WEEKEND WARRIORS FOR WATER: COMBATING WATER SCARCITY IN WEST AFRICA WITH UNITED STATES ARMY NATIONAL GUARD AND RESERVE FORCES, by Major Mary J. Durham, 84 pages.**

Water scarcity is a significant problem across the globe, as expanding populations put mounting pressure on already strained critical resources. The U.S. has spent billions of dollars to alleviate water issues in West Africa and promote sustainable development. However, water scarcity continues to present overwhelming challenges that impact the health and development of West African nations. Influencing these areas requires a multi-pronged approach that relies heavily on capability and capacity development programs. Agencies that spearhead these projects must understand the operational environment of West Africa, have access to knowledgeable personnel with specific skill sets, and be capable of working with a variety of organizations to develop long-term partnerships. The Army Reserve Component (RC) may have the technical expertise and capacity to develop beneficial partnerships with West Africa to alleviate water scarcity, if it is leveraged appropriately.

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## ACRONYMS

AC	Active Component
ADM	Army Design Methodology
AFRICOM	Africa Command
ARNG	Army National Guard
BPC	Building Partner Capacity
DOD	Department of Defense
DOS	Department of State
ECOWAS	Economic Community of West African States
FHA	Foreign Humanitarian Assistance
GCC	Geographic Combatant Command
GWP	Global Water Partnership
HCA	Humanitarian and Civic Assistance
IGO	Intergovernmental Organization
LOE	Lines of Effort
NA	Nation Assistance
NGO	Non-Governmental Organization
NSS	National Security Strategy
P3	Private Public Partnership
QDR	Quadrennial Defense Review
RAF	Regionally Aligned Forces
RC	Reserve Component
SA	Security Assistance
SC	Security Cooperation

SPP	State Partnership Program
TCP	Theater Campaign Plan
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNOWAS	United Nations Office for West Africa and the Sahel
USAID	U.S. Agency for International Development
USAR	United States Army Reserve
USG	U.S. Government
WASH	Water, Sanitation, and Hygiene

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# CHAPTER 1

## INTRODUCTION

### Overview

Water links us to our neighbor in a way more profound and complex than any other.

— John Thorson

Water scarcity is a significant problem in across the globe, as expanding populations put mounting pressure on already strained critical resources. The U.S. and the United Nations (UN), along with a multitude of intergovernmental organizations (IGOs), non-governmental organizations (NGOs), and foreign agencies, have spent billions of dollars to alleviate water issues in West Africa and promote sustainable development. However, water scarcity continues to present overwhelming challenges that impact the health and development of West African nations.

West Africa is a geographic region within the continent of Africa, comprised of 21 countries, which is bound by the Sahara Desert in the north; the Atlantic Ocean to the south and west; and partially by the Cameroonian Mountains to the east (Krabacher, Layachi, and Kalipeni 2009). Throughout the region there are tropical rainforests, woodland savanna, and dry deserts, making it inadvisable to assume that the availability of resources remains constant, even within the same country's borders.



Figure 1. Map of West Africa

*Source:* USAID West Africa, *Regional Development Cooperation Strategy: 2015-2019* (Washington, DC: United States Agency for International Development, 2015), accessed March 17, 2017, <https://www.usaid.gov/sites/default/files/documents/1860/USAID-WARDCS-Public-Version-June%202015.pdf>.

West Africa's waterways, including the major rivers of the Niger, the Gambia, the Senegal, and the Volta, feed river basins such as the Niger and the Lake Chad basins, and seasonal variations significantly impact river flow. Reliance on specific rivers and water basins in West Africa create the necessity for cooperative efforts across national boundaries to manage and improve access to clean water across the continent. Water resources are scarce for areas of the population stricken by poverty, and water cleanliness depreciates significantly based on funding (West African Environmental Studies 2017).

Both human and natural forces significantly impact water availability and accessibility. Water requirements in West Africa have increased due to population growth, economic development, and environmental constraints, all of which have contributed to instability in the region. Heightened demand for clean water permeates society and government, especially in countries already facing water shortages, droughts, and disease.

Influencing these areas requires a multi-pronged approach that relies heavily on capability and capacity development programs. Agencies that spearhead these projects must understand the operational environment of West Africa, have access to knowledgeable personnel with specific skill sets, and be capable of working with a variety of organizations to develop long-term partnerships. The Army Reserve Component (RC) may have the ability to develop beneficial partnerships with West Africa to alleviate water scarcity, if leveraged appropriately.

#### Primary Research Question

Water scarcity issues affect many areas of the world and are expected to become a significant source of conflict across the globe. Although the connection between water scarcity and military operations is not overt, the ability to prevent future conflict, improve regional stability, and alleviate human suffering are integral to protecting and promoting U.S. interests. The link between water scarcity in West Africa and the RC leads us to the primary research question, "should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa to promote regional stability and provide humanitarian aid?" The RC is already being used to build partner capacity, improve security cooperation, and conduct regional stabilization missions around the

world, but there may be room to expand these programs to include water scarcity projects in West Africa. However, there is always the risk that employing military forces in too many areas will overextend their capabilities and overtax their resources. This thesis explores considerations related to increasing the supporting role of the RC in combating water scarcity in West Africa without becoming the primary stakeholder in any particular program.

### Secondary Research Questions

There are several secondary questions to answer before drawing any reasonable conclusions regarding the primary research question, "should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa to promote regional stability and provide humanitarian aid?" These secondary questions support an analytical approach to answering the primary research question by breaking it down into separate components.

The secondary questions to be answered in this thesis are:

1. Does water scarcity in West Africa present a reasonable security concern to the U.S. and require military intervention to alleviate any potential threat?
2. Are the expectations for RC involvement consistent with U.S. Government authorizations, policies, and directives for an acceptable employment of the force?
3. Does the RC have the technical capabilities to provide humanitarian and civic assistance to alleviate water scarcity and shape the strategic environment in West Africa?
4. Should the militarization of development assistance be avoided?

The secondary research questions provide a logical way to frame the problem and conduct an analysis using established criteria to determine the feasibility of a particular course of action. The resulting answers will provide a solid foundation on which to draw conclusions that support an answer to the primary research question, contribute to the existing body of knowledge, and encourage further research.

Although water scarcity is a significant concern in West Africa, it must first be determined how much of an impact it has on local and regional stability, and whether that influence presents enough concern to warrant direct U.S. military intervention. Any action or inaction regarding foreign nations must be supported by U.S. policies and comply with National Strategic Guidance. The complexity of the West African security environment makes problem framing and setting parameters to clearly define roles and responsibilities essential to conducting effective research. Supporting Nation Assistance (NA) programs in West Africa, such as those providing Humanitarian and Civic Assistance (HCA), is not new for the U.S. These programs are normally led by the Department of State (DOS) and the U.S. Agency for International Development (USAID), with support from the DOD and other Intergovernmental Organizations (IGOs). To ensure that U.S. agency efforts are not overlapping, there must be a clear delineation of responsibilities and the development of a unified effort within joint and interagency assistance projects.

After analyzing whether an action is warranted, the employment of the RC must be assessed to determine whether the organization is capable of performing the desired actions within the boundaries of existing national policies, authorizations, and directives guiding employment of the force. This thesis focuses on the use of RC primarily because

they contain a preponderance of the Army's critical technical enablers, as well as the ability to leverage Citizen-Soldier expertise against complex problems (Department of Defense 2016). Integrating the RC into any plan to combat water scarcity in West Africa requires an understanding of organizational experience, force capabilities and depth, and the ability to achieve program goals in the long-term.

Finally, there must be a determination on whether the militarization of development assistance should be avoided. U.S. Armed Forces regularly operate in a Joint, Interagency, or Coalition environment and are accustomed to performing the lead role. However, considerations regarding program sustainability, resource management, and the global perception of U.S. intervention may influence whether the U.S. military should assume a greater supporting role in combating water scarcity. The research will conclude with a determination on whether the DOD should leverage existing RC programs to more effectively support U.S. Africa Command (AFRICOM) in providing humanitarian assistance and promoting stability in West Africa.

### Assumptions

To help shape the direction of the research and establish a foundation for this thesis, the researcher must make several assumptions. Assumptions are ideas or concepts that are generally accepted as truth without requiring a presentation of proof (Leedy and Ormrod 2005). These assumptions will allow the researcher to draw conclusions based on analysis, predictable trends, and observed patterns within the research material.

The primary assumption is that West African countries will be willing to partner with elements of U.S. military for aid in alleviating water scarcity issues over the next ten years. Without this assumption, any further research into whether the RC should be

leveraged to provide HCA would be pointless. For the purposes of this study, it is assumed that nations with a pre-existing relationship with DOD programs, such as those participating in the ARNG State Partnership Program (SPP), will be willing to accept U.S. military assistance in finding solutions to water scarcity and security challenges.

The second assumption is that the RC will maintain its status as an operational force under Department of Defense Directive 1200.17 and will continue to receive funding to support manning, resourcing, and training. This directive outlines essential principles and policies that support the development and continued support of the RC as part of the total defense force. As such, the RC is tasked to provide “operational capabilities and strategic depth to meet U.S. defense requirements across the full spectrum of conflict, including under sections 12301, 12302, 12304, and 12306” (Department of Defense 2008). A change in RC force status would have a significant impact on its ability to sustain NA and HCA operations over the next ten years.

The third assumption is that Africa will remain a national interest for the U.S. in the foreseeable future. U.S. foreign policy in Africa is focused on gaining private and public sector access, promoting regional stability through security cooperation, and encouraging sustainable development (National Security Council 2015). Based on the U.S.’ continued interests in Africa, it is assumed that the need for military partnerships will remain and that the DOD will support NA operations, building partner capacity (BPC) missions, and defense engagement (DE) programs to develop and maintain positive relationships in the region.

## Definitions and Terms

This thesis uses specific terms and acronyms to discuss the RC and water scarcity issues in West Africa. Developing a common lexicon of terms relating to this study will facilitate understanding of the research material and its subsequent analysis.

Reserve Component (RC): The RC is composed of both Reserve and Guard forces. The Army, Navy, Marine Corps, Air Force, and Coast Guard Reserves each consist of three specific categories: Ready Reserve, Standby Reserve, and Retired Reserve (Department of Defense 2017).

Security Cooperation (SC): The Department of the Army defines SC as all DOD interactions with foreign defense establishments to build defense relationships that promote specific U.S. security interests, develop allied and friendly military capabilities for self-defense and multinational operations, and provide U.S. forces with peacetime and contingency access to a host nation (Department of the Army 2015).

Water Scarcity: Water scarcity is the lack of access to adequate quantities of water for human and environmental use (White 2012).

Water Security: Water security relates to the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability (UN Water 2017).

Water Stress: Water stress occurs when the demand for water exceeds the available amount over a certain period, or when poor quality restricts its use (European Environment Agency 2017).

### Limitations and Delimitations

There are a multitude of areas that cannot be included in this research based on existing limitations. Since this is an unclassified study, all information for this project is obtained using open source documents, such as books, magazine and journal articles, and internet resources. Any information above the unclassified security designation will not be included in this study.

Delimitations aid in defining the scope of the research project and are intentional restrictions that guide the direction of the study. There are six significant delimitations to this study:

1. The study provides a broad overview of water scarcity challenges in West Africa that present opportunities to promote regional stability and provide humanitarian assistance, rather than examining individual water scarcity projects in specific countries.
2. The study focuses on the development of long-term water scarcity programs that fall under the auspices of NA and HCA, rather than Foreign Humanitarian Assistance (FHA) or Foreign Disaster Relief (FDA).
3. For the purposes of this study, use of the term RC will focus on specifically on the Army RC and will not include Air Force, Navy, Marine, or Coast Guard RC.
4. The study will not include research on program funding or the approval process for program expansion.
5. The role of China and its military in West Africa is beyond the scope of this research and will not be examined.

6. Research on this topic will be conducted until March 30, 2017, after which the researcher will focus on analyzing information, drawing conclusions, and developing recommendations for future study.

### Significance of the Study

This research seeks to provide an additional point of view regarding military force employment in support of NA operations. The study will generate discussion within the military community and advance the body of knowledge on the integration of the RC into long-term planning to support HCA missions, such as combating water scarcity in West Africa.

### Chapter Conclusion

This thesis seeks to determine if further integration of the RC into AFRICOM's strategy in West Africa is feasible and would provide a suitable force to support the achievement of U.S. national security objectives. The next chapter, chapter 2, will review literature relevant to the issues surrounding water scarcity in West Africa and the employment of the RC in support of NA and HCA missions. It will then explore whether the RC can support AFRICOM's mission to promote security and stability in West Africa by focusing on water scarcity challenges. Chapter 3 will outline the research methodology applied during this study, and chapter 4 will analyze the collected qualitative data and discuss the findings. Chapter 5 will briefly reiterate the findings from chapter 4 and provide recommendations for decision-makers and future areas of study.

## CHAPTER 2

### LITERATURE REVIEW

#### Chapter Introduction

Many areas impact whether integrating the RC into water scarcity programs in West Africa is a viable option. Conducting a literature review of the existing body of knowledge on water scarcity in West Africa helps to achieve a broad understanding of the surrounding issues and identify specific areas of need. It also ensures that any proposed aid will comply with U.S. policies, authorizations, and directives governing the mobilization and deployment of RC forces in support of NA and HCA programs.

This study draws from a variety of sources to develop an understanding of the problem, including books, articles, periodicals, newspapers, and internet resources. The data is separated into four categories to facilitate classification:

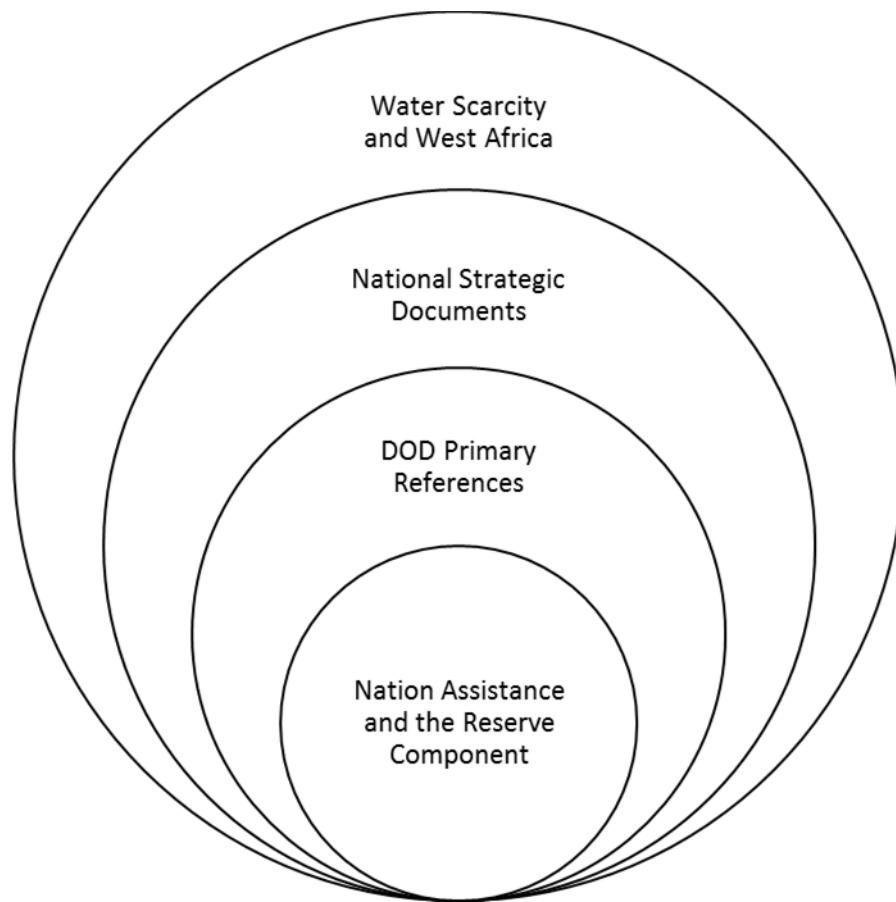


Figure 2. Thematic Literature Review Categories

*Source:* Developed by the author.

Organizing the literature review into thematic categories will provide both the researcher and the reader with a better understanding of the material that influenced this project. A background study of water scarcity and its related challenges in West Africa will lead off the literature review, providing a foundation for the rest of the study. Once there is an understanding of the issues surrounding water scarcity, the next two sections of the literature review will examine documents that shape the strategic use of the RC. Any proposed action involving the employment of the RC must be nested with national

security strategies and comply with USG and DOD policies, authorizations, and directives. The literature review will then conclude with an exploration of the RC's role in conducting NA as it relates to operations that fall under the auspices of HCA.

### Water Scarcity and West Africa

Water scarcity and water security challenges in West Africa are inordinately complicated. To simplify understanding and build a reasonable foundation for the rest of the study, this section of the literature review will be further divided into three subcategories: 1) an overview of general water scarcity terminology and forms of measure; 2) water scarcity challenges in West Africa; and 3) the identification of key stakeholders.

#### Water Scarcity Terminology and Measurement

Water availability has emerged as a dominant global concern over the past century. Despite the fact that the Earth is primarily composed of water, less than one percent of fresh water resources are available and suitable for human use (Padowski and Jawitz 2009). Water resource management and sustainability practices have come to the forefront of international discussions and cooperative efforts as water supplies dwindle in response to an exponential increase in demand. Combating water stress, water scarcity, and water security requires a delicate balance of international aid, organizational support, resource management, and the sustained will of the populace.

The complexity of water scarcity issues in West Africa makes it imperative for any researcher to ensure that there is a broad understanding of language, terminology and standards. The starting point for this project is The Sphere Handbook: *Humanitarian*

*Charter and Minimum Standards in Humanitarian Response.* The Sphere Project provides an internationally recognized charter for humanitarian aid and acceptable standards for humanitarian response (Sphere Project 2017). Although the Sphere Handbook is more centered towards providing aid in response to disaster or conflict, the international standards and requirements for water are applicable to this research.

While the Sphere Handbook provides guidance for organizations and agencies providing immediate humanitarian assistance in the face of catastrophe, effective water scarcity projects require an understanding of the subtle differences between short-term and long-term projects. The first challenge is in regards to language. There is a lack of consensus within the international community on what water stress and water scarcity actually mean. Different organizations and agencies have developed their own criteria and forms of measurement in an attempt to simplify a complex problem in a way that makes sense to them. These variations can cause confusion, not only for researchers and international aid organizations, but for the affected populations as well (White 2012).

Many organizations are working to develop a shared understanding of terms that can help standardize water assessment and reporting. Figure 3 below illustrates a proposal developed by the CEO Water Mandate to clarify the differences between water stress, water scarcity, and water risk. Although it analyzes the information from a business standpoint, it illustrates a way to break down a complex problem into manageable parts.

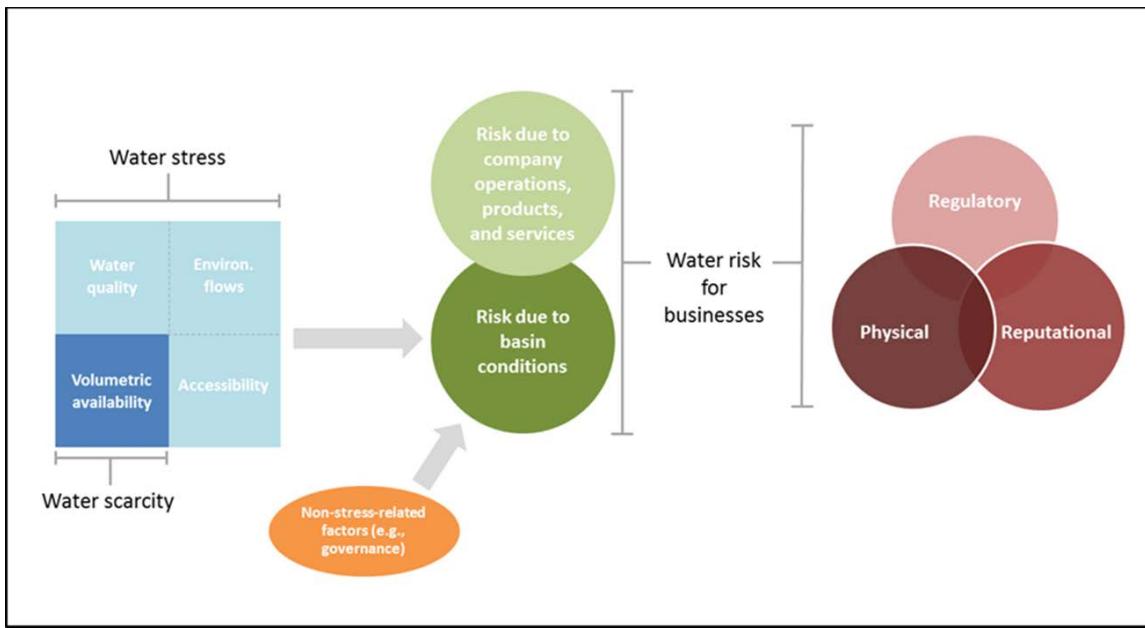


Figure 3. Water Scarcity Terminology

Source: Peter Schulte, “Defining Water Scarcity, Water Stress, and Water Risk: It's Not Just Semantics,” Pacific Institute Insights, February 4. 2014, accessed February 23, 2017, <http://pacinst.org/water-definitions/>.

Although terminology and definitions may vary from organization to organization, there are enough consistencies to gain a general understanding of the concepts. Water stress occurs when the demand for water exceeds the available amount during a certain period or when poor quality restricts its use (European Environment Agency 2017). Water scarcity is a lack of water based on either quantity or quality and can relate to economic or physical scarcity (The Water Project 2017). Water stress and water scarcity influence overall water security. According to the UN Interagency Water Cooperative (IWC), water security encompasses “the capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring

protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability" (United Nations 2013). This definition is particularly relevant, as it highlights the importance of water as a valuable resource that must be protected for a population to survive and thrive.

However, the mere presence of water is not enough. Water quality, accessibility, and management are key components that contribute to water scarcity issues. Researchers have developed a variety of measurement systems that attempt to accurately account for these variables in their analysis, but the complex nature of the problem enhances the difficulty. The three most common forms of measurement of water scarcity and water stress are the Falkenmark Water Stress Index (WSI), the Water Poverty Index (WPI), and the International Water Management Institute (IWMI)'s Water Scarcity Index.

The WSI evaluates the total water resources available to a regional population and then assesses the amount of renewable fresh water available for each person per annum (White 2012). This system of measurement is used by the UN and the World Bank to evaluate water supply conditions by country. Figure 4 below uses the WSI to illustrate projected trends in water stress and scarcity in Africa.

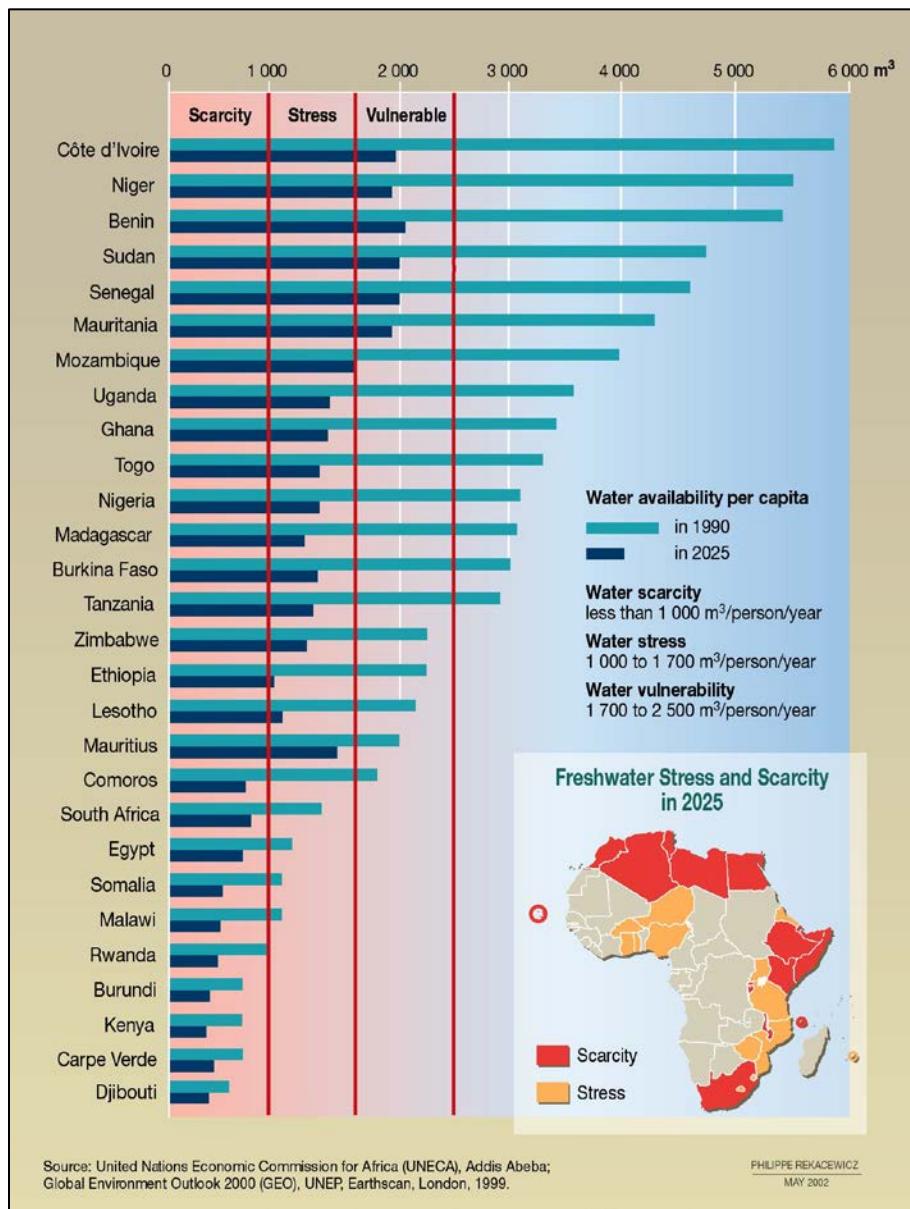


Figure 4. African Fresh Water Stress and Scarcity in 2025

Source: United Nations Economic Commission for Africa “UNECA,” accessed March 15, 2017, <http://www.uneca.org>.

The Water Poverty Index (WPI) establishes a framework to assess water development progress by evaluating areas within the five key categories: resources,

access, capacity, use, and environment (Using the Water Poverty Index to Monitor Progress in the Water Sector 2017). WPI scores range from 0 to 100, with lower scores indicating extreme water poverty. Finally, the International Water Management Institute's (IWMI) Water Scarcity Index combines a variety of variables to determine water scarcity, including water infrastructure, water consumption, and the potential for water infrastructure and technology development (White 2012).

All of these indexes attempt to establish qualitative or quantitative forms of measurement to frame the existing problem and identify potential causes or influences. However, since each one measures differing areas influencing water quality and availability, it is extremely difficult to establish a consistent assessment of water scarcity issues in a particular region (White 2012). The vast number of internal and external pressures exerted by individuals, organizations, and nations with a vested interest in water resourcing issues compounds the problem.

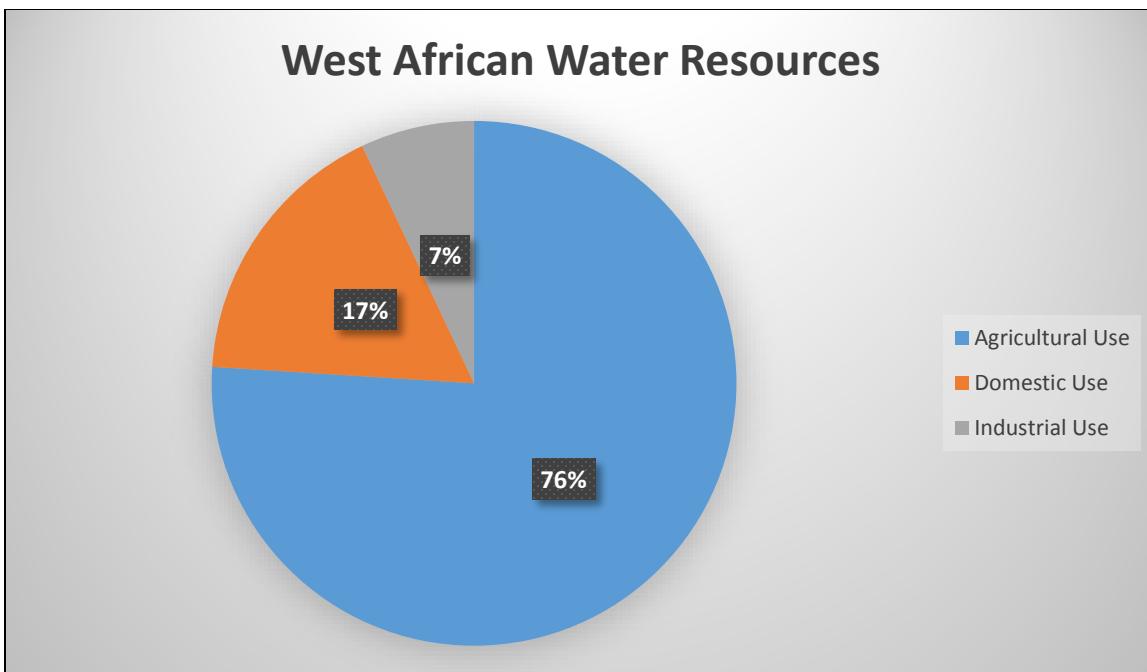


Figure 5. West African Water Resources

*Source:* Global Water Partnership., “GWP in Action-West Africa,” accessed February 24, 2017, <http://www.gwp.org/en/gwp-in-action/West-Africa/>.

### Water Scarcity Challenges

West Africa's water challenges are as diverse as the continent. Many researchers have indicated that alleviating water scarcity in any part of Africa will require an approach that transcends country and regional boundaries, due to the interconnected nature of Africa's waterways and networks. Economic opportunities, including the integration of West Africa into a global market economy, have changed the land and water use dynamic in the region (U.S. Geological Survey 2017). As depicted in figure 5, agriculture consumes 76 percent of West Africa's water resources. Only 17 percent of its water resources are used domestically, with the remaining 7 percent available for industrial use (Global Water Partnership 2017).

Analysts have indicated that water scarcity in West Africa is expected to become increasingly problematic over the next ten years, as the growing demand for fresh water exceeds availability. While water problems vary by country, the region as a whole will be significantly affected by the inaccessibility of water for individual and collective use. Water shortages are likely to lead to a decrease in food and energy production, causing food shortages at the local, regional, and international levels, as well as impeding vital economic growth (Intelligence Community Assessment 2012).

Water scarcity is also likely to impact security and stability in West Africa. According to the Fragile State Index, fragile states are those countries demonstrating multiple risk factors that could lead to state failure. As indicated in Figure 6 below, the majority of West African nations are at risk.

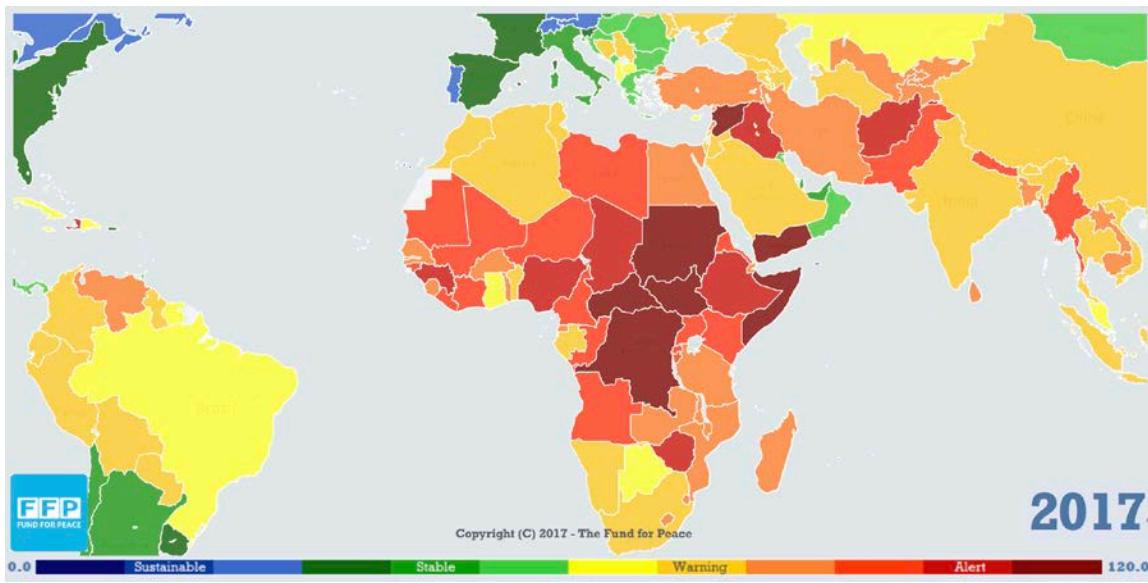


Figure 6. Fragile State Heat Map

*Source:* Fund for Peace. 2017. "Fragile States Heat Map." accessed February 24, 2017, <http://fundforpeace.org/fsi/analytics/fsi-heat-map/>.

One attribute of failure risk commonly observed in fragile states is an inability to provide basic public services to its population, such as water, sanitation, and reasonable health care (Fund for Peace 2017). Governments that cannot provide for their populations due to lack of infrastructure or ineffective political institutions may be destabilized, leading to increased social, economic, and political tension (Intelligence Community Assessment 2012). Cultural clashes, extreme poverty, and outbreaks of disease increase the likelihood of conflict. Instability in fragile states can provide favorable conditions for the growth of violent extremist organizations (VEOs) and terrorist activities.

There are opposing viewpoints on whether the next major war will be over water. Some believe that the strain on water resources will not only damage the health of individuals and ecosystems, but it will also elevate problems ranging from food shortages to all out warfare, as depicted in figure 7 below.

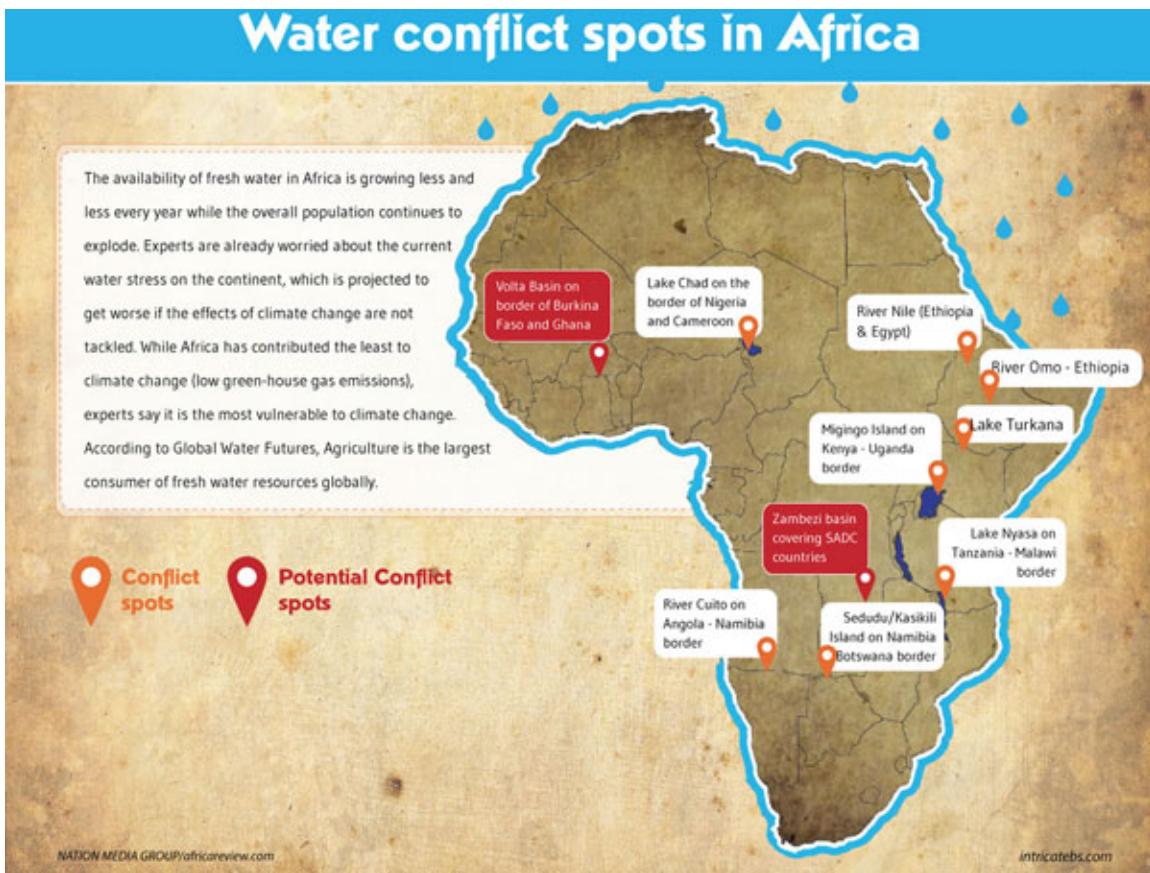


Figure 7. Projected Areas of Water conflict in Africa

Source: Janet Otieno, "Understanding Africa's Water Wars," *Africa Review*, November 6, 2013, accessed March 15, 2017, <http://www.africareview.com/special-reports/Understanding-the-water-wars-in-Africa/979182-2062968-140f6dk/>.

Disputes over territory and resources is a common occurrence in West Africa.

While violence is not always directly related to water, the second and third order effects of water scarcity play a role in regional instability. For example, the Lake Chad river basin and its associated interconnected waterways support an estimated 30 million people from four countries: Cameroon, Chad, Niger, and Nigeria (USAID 2017). However, climate change has caused a significant and troubling decrease in the water in the river basin. The lack of water has exacerbated food scarcity issues, expanded the spread of

disease, and increased regional instability, leaving the populations vulnerable to the influence of VEOs, like Boko Haram (USAID 2016).

Not everyone believes that the existing water challenges will end in warfare. Many researchers support the position that countries suffering from water scarcity will develop strong partnerships and shared regional identities through water cooperation efforts and water management strategies (Wolf et al. 2006). The efforts of local, regional, and international communities to form cooperative organizations dedicated to establishing standards for humanitarian aid and finding solutions to water scarcity problems gives credence to this concept.

#### Key Stakeholders

There are an expansive number of organizations that have a vested interested in combating water scarcity issues in West Africa, either directly or indirectly. These organizations strive to create partnerships and coalitions that can leverage collective resources to neutralize existing threats to peace and sustainable development. Due to the complex nature of water scarcity, there are a variety of ways the problem can be addressed. Economic, social, and politically based organizations strive to implement viable changes that will alleviate pressure on vulnerable areas and populations while shaping future conditions to prevent the continued degradation of resources. Any organization hoping to have an impact on combating water scarcity in West Africa must be aware of the key stakeholders operating in the area and a general understanding of their interests and goals.

## IGOs

IGOs play variety of roles in West Africa. These diverse organizations are created by a formal agreement between two or more governments (Joint Chiefs of Staff 2014). These organizations vary in composition and effectiveness, striving to fulfill an assortment of needs and functions. Primarily, IGOs promote international or regional cooperation in specific areas of concern, such as the promotion of human rights, environmental protection, or economic development (Joint Chiefs of Staff 2014). Internal influential IGOs involved in West Africa are the African Union, the Conseil de l'Entente; the Economic Community of West African States (ECOWAS); the West African Economic and Monetary Union (UEMOA); and the Intergovernmental Authority on Development (IGAD).

One of the primary external IGOs that influences water scarcity in West Africa is the UN. The UN is currently comprised of 193 nations and is designed to shape international cooperation and order (United Nations 2017). Several subordinate agencies within the UN have a significant impact on water scarcity and water security in West Africa. UN-Water functions as a mechanism for inter-agency coordination on all fresh water related issues (UN Water 2017). The UN Economic Commission for Africa (ECA) is “the only UN agency mandated to operate at the region and sub-regional levels to harness resources and bring them to bear on Africa’s priorities” (United Nations Economic Commission for Africa 2017). These organizations are designed to coordinate international efforts in response to global crisis and to support the development of achievable goals, targets, and actions (UN Water 2017).

In 2015, the UN established 17 Sustainable Development Goals (SDGs) for 2030, which are development priorities for eradicating poverty, protecting the environment, and promoting prosperity around the world (United Nations 2017). Included in the SDGs are clean water and sanitation initiatives. These development goals create a sense of purpose and unity of effort within the international community to achieve a desired global end state. The USG supports the SDGs and has dedicated programs and funding to aid the UN's efforts.

### NGOs

In addition to IGOs in West Africa, there are private, non-profit, non-governmental organizations (NGOs) that are self-governing (Joint Chiefs of Staff 2014). These organizations provide a wide variety of programs and services to aid in the alleviation of human suffering and the management of economic, environmental, and social issues. NGOs commonly rely on a perception of neutrality under the UNOCHA Guidelines on the Use of Military and Civil Defense Assets in Disaster Relief, more commonly known as the “Oslo Guidelines” to accomplish their goals (Joint Chiefs of Staff 2016). The extent that NGOs cooperate with military authorities varies by organization.

### U.S.

The Paul Simon Water for the Poor (WfP) Act of 2005 is the guiding document providing authorization for U.S. water scarcity programs (U.S. Department of State 2010). It outlines the U.S. strategy to improve water and sanitation access in developing countries while promoting effective water resource management. The DOS and USAID

currently run the U.S. water policy in Africa and work in concert with various layers of local, regional, and national levels of government to develop programs that encourage sustainable development, guide resource management practices, and reduce poverty (USAID 2016). USAID operates the West Africa Water Supply, Sanitation and Hygiene Program (WA-WASH), to aid in developing low-cost solutions to water related issues (USAID 2016). They also coordinate with the U.S. Water Partnership, which partners U.S. government agencies, private businesses, and public organizations to address global water challenges and discover sustainable solutions (U.S. Water Partnership 2017).

### Other Organizations

There are a plethora of private and public companies, agencies, and governments that strive to provide humanitarian aid, enhance security, and encourage long-term development in West Africa. With the sheer number of stakeholders attempting to shape West Africa's future, it behooves the U.S. to leverage available resources to work in collaboration with regional governments to increase water accessibility, sustainability, and quality (West African Environmental Studies 2017).

### National Strategic Direction

After outlining the water scarcity problem and key stakeholders in West Africa, the research shifts towards developing an understanding of U.S. national strategic direction and the guiding documents that shape the employment of military assets. A study of this material will aid in identifying any linkage between U.S. national strategy and water scarcity challenges in West Africa.

The primary documents that provide U.S. strategic guidance are the National Security Strategy (NSS), National Defense Strategy (NDS), and National Military Strategy (NMS). These three documents enable leaders to visualize how to most effectively leverage assets and resources to meet stated strategic objectives. They also shape the integration and application of military force into national strategic policies. All of these documents are unclassified and the information is releasable to the general public.

It is important to remember that the national security strategy is presented as a strategic vision, using shaping documents to give guidance to subordinate organizations. These documents provide a broad overview of national security priorities and objectives, allowing subordinate agencies the opportunity to determine how to best to use their organizations to achieve the desired end state. They also assume that a valid national security strategy will require a whole of government approach that integrates interagency and international cooperation to achieve the desired objectives.

Understanding the NSS is essential to ensuring that any course of action implemented in West Africa is nested with U.S. policies and protects national security interests. The NSS is published every five years and outlines the president's vision, guides national security actions, and shapes the development of subordinate organizational strategies. One of the four Lines of Effort (LOEs) described in the NSS to minimize risk to U.S. security interests is to build capacity to prevent conflict (National Security Council 2015). Partnerships are a necessity, as they aid in safeguarding national interests against global risks and provide joint assets to share global security burdens.

The NDS, entitled "Sustaining U.S. Global Leadership: Priorities for the 21st Century" outlines how the DOD will support the national security objectives contained in the NSS. By identifying the challenges and risks within the current strategic environment, the NDS presents a vision of the tasks set by the NSS and how they will be accomplished. The NDS emphasizes the importance of engagements with other nations to protect U.S. national interests and achieve NSS objectives (Department of Defense 2012). It also underscores the need for U.S. military to expand capacity, capability, and readiness to defend the homeland and deter aggression. While U.S. capabilities cannot address all the global challenges, creating international partnerships will enhance security and response capabilities around the world.

The NMS provides an overview of the nation's strategic challenges and details how the U.S. will employ the joint force to render safety to the U.S and its allies (Chairman Joint Chiefs of Staff 2015). The NMS provides military leaders direction to prioritize missions according to national security interests. Using the "ends-ways-means" construct, the NMS identifies U.S. national military objectives (ends), the supporting strategic and operational concepts (ways), and the resources and capabilities that will be used to conduct operations (means). The NMS must also account for risk based on the stated objectives and subsequent courses of action.

A review of U.S. National Strategic Direction documents aids in determining an answer to the secondary research question, "are the expectations for RC involvement consistent with U.S. Government authorizations, policies, and directives for an acceptable employment of the force?". The next section will go into further detail on the DOD

references and authorities that provide the framework for determining how each military component is used.

#### DOD Primary References

DOD authorizations, policies, and directives are intended to be firmly nested with national strategic direction documents. Logically, reviewing the existing DOD documents will provide the researcher with a clearer understanding of how military forces are used to support foreign assistance operations.

In most cases, the DOD will use its unique capabilities and technical experience to provide support for FHA and NA programs led by other USG agencies (JP 3-29). However, although the DOD partners with the DOS and USAID on water scarcity programs, it has its own internal authorizations, directives, and policies guiding the acceptable use of military assets in response to humanitarian assistance operations. FHA and NA operations can be conducted concurrently, but have distinct differences and unique requirements.

FHA is a broad term, defined in Joint Publication (JP) 3-29, *Foreign Humanitarian Assistance*, as “Department of Defense activities conducted outside the U.S. and its territories to directly relieve or reduce human suffering, disease, hunger, or privation”. Contained within the FHA operational “umbrella” are additional subsections that classify different types of aid, including FDA, foreign consequence management (FCM), dislocated civilian support missions, security missions, and technical assistance and support functions (Joint Chiefs of Staff 2014).

NA operations are planned, long-term engagements that focus on promoting sustainable development and growth in host nations (Joint Chiefs of Staff 2014). NA

missions can include foreign internal defense (FID), security assistance, and HCA. The fundamental difference between FHA and NA is the scope and duration of operations. FHA military missions must have clearly defined objectives and timelines for completion that lead to attainable end states.

#### Nation Assistance and the Reserve Component

Based on Title 10 of the U.S. Code, the purpose of the RC is “to provide trained units and qualified persons available for active duty in the armed forces, in time of war or national emergency, and at such other times as the national security may require, to fill the needs of the armed forces whenever more units and persons are needed than are in the regular components.” This authorizes use of RC forces to be deployed in support of NA and HCA operations to protect national security and national interests. Water scarcity programs would fall under HCA provided they do not duplicate any existing program run by other U.S. agencies or departments (Joint Chiefs of Staff 2014). DOD Instruction 2205.02, *Humanitarian and Civic Assistance (HCA) Activities*, goes into further detail regarding HCA operations and the requirements for integration into the Theater Campaign Plan (TCP) of a GCC, like AFRICOM.

#### Chapter Conclusion

Water scarcity significantly impacts development, health, and security in West Africa. Based on the literature review, providing humanitarian assistance and promoting regional stability are in line with the U.S. National Strategic Direction and reveal a need to expand aid to maintain stability in the region. However, threats to security, technological limitations, an expanding population, and financial constraints present

significant challenges. The next chapter, chapter 3, will outline the research methodology for this study.

## CHAPTER 3

### RESEARCH METHODOLOGY

#### Chapter Introduction

The researcher will employ several methods to answer the primary research question “should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa in order to promote regional stability and provide humanitarian aid?” These methods include conducting a literature review, developing an operational approach, and analyzing the research material using defined evaluation criteria to draw reasonable conclusions. The information obtained through research, analysis, and answers to the secondary research questions provides the foundation for answering the primary research question.

This chapter discusses the methodology for data collection and analysis. Research into the topic and the subsequent literature review aid in determining whether the RC can be effectively leveraged to aid in water scarcity projects in West Africa. Chapter 3 is divided into two sections: Data Collection Methods and Analysis Methodology. Relevant data regarding the three primary topics of interest, water scarcity issues in West Africa, RC roles, responsibilities, and capabilities, and challenges to the stability of the region, will be collected to conduct a qualitative analysis. Specific evaluation criteria are applied against the effect of water scarcity on West Africa, the effectiveness of existing RC water scarcity programs, and the development of potential relationships with IGOs, NGOs, and other key stakeholders.

### Operational Approach

Since water scarcity is a multi-faceted problem in West Africa, developing a broad concept to aid in defining achievable objectives that will drive events towards the desired end state is extremely challenging. A common tool used to connect an understanding of the current conditions to the desired end state through the development of lines of effort and specific objectives is called an operational approach (Kem 2012). This method is used to ensure the overarching lines of effort nest appropriately with AFRICOM, the DOD, and the NSS, and focus on what should be done to accomplish the mission, rather than how it should be accomplished.

The visual framework that the operational approach is shown in figure 8. By depicting the operational approach in this manner, the relationships between current and future conditions, objectives, and the projected timeline becomes more understandable.

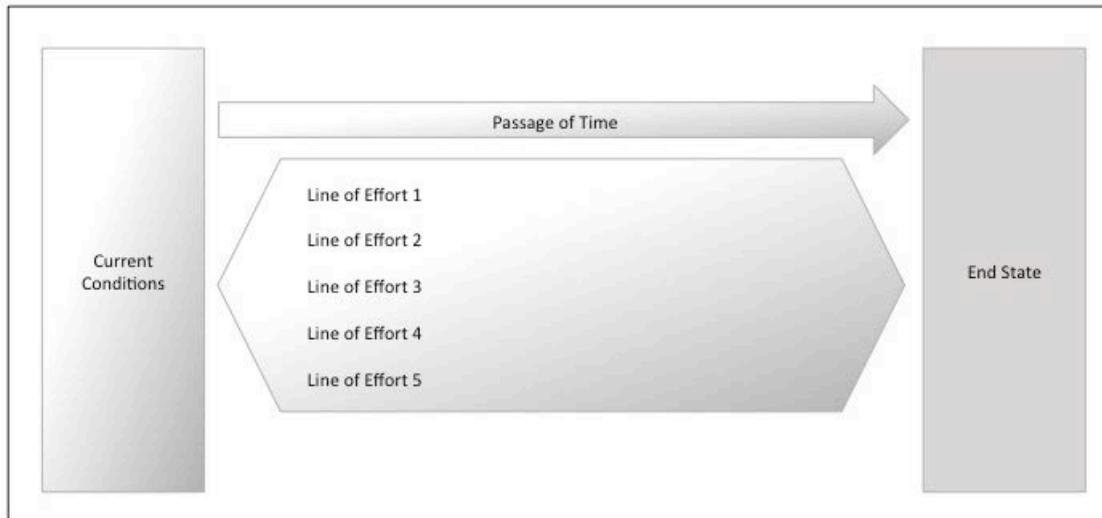


Figure 8. Operational Approach – Generic

Source: Kem, Jack D. *Planning for Action: Campaign Concepts and Tools*. (Fort Leavenworth, KS: U.S. Army Command and General Staff College, 2012).

### Data Collection Methods

Qualitative information will be used to answer the primary and secondary research questions, as USG documents pertaining to the topic were primarily qualitative sources. No significant quantitative data was used for this thesis, as the data was not authorized for public access.

The purpose of this research is to evaluate whether RC capabilities can be leveraged using existing programs to combat water scarcity in West Africa. This research will provide Army leaders with information regarding the RC and how it can be used to enhance water scarcity programs. Findings and recommendations developed during this study were guided by the thesis chair and committee.

### Evaluation Criteria

Establishing standards to use as a form of measurement is useful in determining whether a proposed solution will result in the achievement of the desired end state. Evaluation criteria provides a framework that will aid in determining if the course of action meets specific requirements. For this study, the primary research question, "should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa to promote regional stability and provide humanitarian aid?" will be measured against the following three criteria: relevance, efficiency, and impact. Each section will be evaluated using the following color and symbol designators: negative (red, -); neutral (yellow, O); and positive (green, +).

Table 1. Evaluation Criteria			
	-	O	+
1) Relevance			
2) Efficiency			
3) Impact			

*Source:* Developed by the author.

Measuring the relevance of the course of action will determine whether its objectives are consistent with the expressed need. In this case, are water scarcity projects conducted by the RC relevant to the key stakeholders? Will they benefit the U.S., the West African population, and the international community? Do they comply with overarching U.S. strategies, policies, and interests? Evaluating the relevancy of the project and the selected organization to fulfill those project requirements is a vital piece in ensuring that the desired end state can be achieved.

A measure of efficiency enables the researcher to determine how inputs, such as resources, are converted into outputs. The resource for water scarcity projects in this case would be the RC. Efficient management, coordination, and monitoring of projects is essential to make sure that leveraging the RC is a cost-effective solution that provide the desired results in the defined timeframe.

Assessing the impact of the course of action will determine the extent to which the course of action is likely to produce positive or negative long-term change in the desired primary and secondary areas. Alleviating water scarcity is the primary objective. However, secondary effects generated by addressing water scarcity challenges could

affect economic, political, and social change. These impacts could further influence individuals, communities, and institutions on micro and macro levels. The question of whether to employ RC forces to combat water scarcity challenges in West Africa will be analyzed using the stated evaluation criteria and the results will be discussed in chapters 4 and 5.

### Research Methodology

Water scarcity in West Africa is an enormously complex issue, with a myriad of internal and external influences. The research conducted during the literature review provided an expansive amount of data related to the RC and water scarcity challenges in West Africa. To derive meaning from this information, the researcher conducted data analysis from a qualitative research methodology approach, which is used to answer questions related to complex problems (Leedy and Ormrod 2005).

The extensive variables relating to water scarcity in West Africa could make it easy to get lost in the extensive information available on the subject. Analysis of the problem and relevant information surrounding it required a great deal of exploration driven by a specific focus and carefully structured guidelines. To organize the study and keep it focused on finding a solution to the stated question, the researcher conducted a step-by-step approach:

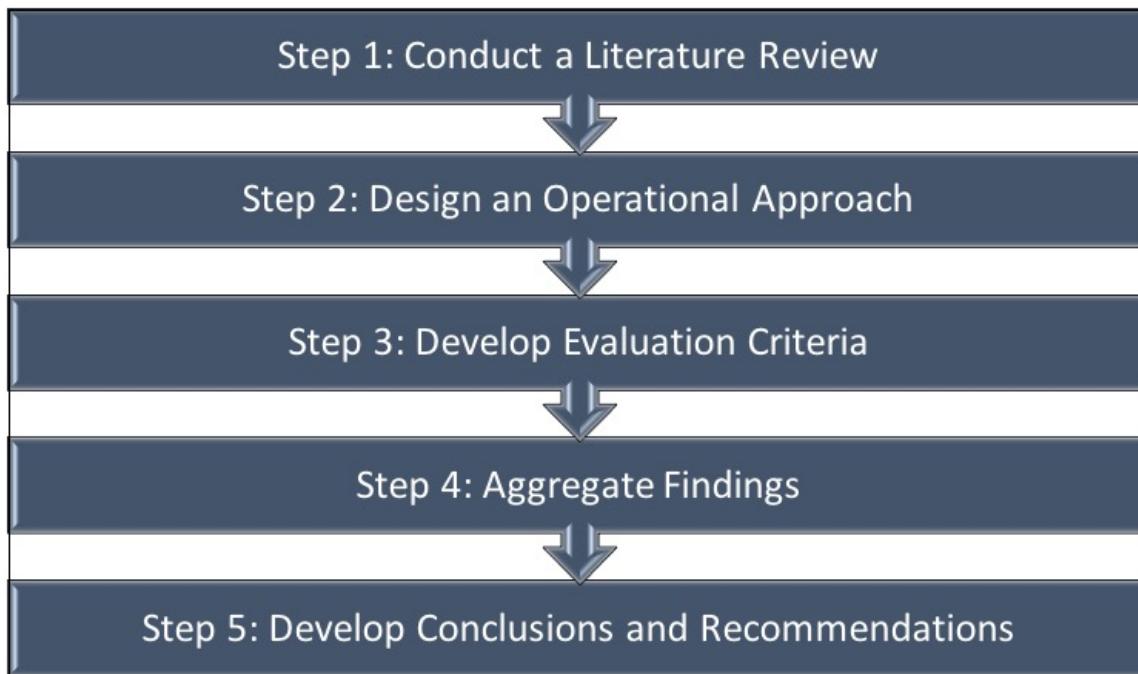


Figure 9. Research Methodology

*Source:* Developed by the author.

As shown in figure 9 above, there are five steps to this process. The first step in the research design is to analyze the results of the literature review to answer the question, “should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa in order to promote regional stability and provide humanitarian aid?”

Step two in the research design is to conduct a needs analysis to determine the challenges and opportunities; system deficiencies; capability gaps; and areas requiring improvement. The results of this analysis will include an Operational Approach and the development of lines of effort.

Step three is to develop a framework of evaluation criteria to assist in determining answers to the following secondary research questions:

1. Does water scarcity in West Africa present a reasonable security concern to the U.S. and require military intervention to alleviate any potential threat?
2. Are the expectations for RC involvement consistent with U.S. Government authorizations, policies, and directives for an acceptable employment of the force?
3. Does the RC have the technical capabilities to provide HCA to alleviate water scarcity and shape the strategic environment in West Africa?
4. Should the militarization of development assistance be avoided?

As discussed previously, the evaluation criteria will be applied to determine the proposed solution's relevancy, efficiency, and impact.

The fourth step in the research design is to aggregate the findings once the evaluation criteria have been applied. This, when combined with the operational approach, will answer the primary research question. Finally, step five in the research design is to draw conclusions and make recommendations for future research.

#### Threats to Validity and Biases

Threats to validity can influence the dependability of the research, accuracy of the results, and reliability of the conclusion. External validity threats can reduce the ability of the researcher to generalize research findings and accurately relate them to other areas of research. Selection bias is a significant threat to this research, since the research focuses on West Africa in general, rather than looking at the challenges within the individual nations that comprise it. Selection bias can occur if the samples discussed in the research do not effectively represent the population studied, leading to flawed generalizations.

West Africa's cultural, economic, and environmental complexity make it challenging to

discuss specific solutions to water scarcity issues that will apply equally across 21 diverse nations. To avoid selection bias, the researcher has striven to focus on general issues that affect the broader population of West Africa.

The validity of this research is also threatened by the risk of bias influencing the research and its findings. As a member of the military and a member of the RC, the researcher runs the risk of displaying bias towards a military solution to water scarcity issues in West Africa. Confirmation bias towards the RC and a militaristic approach can lead the researcher to exclude other options and courses of action that might lead to more appropriate solutions to water scarcity issues in West Africa. By acknowledging these threats, the researcher hopes to mitigate any potential negative influences on the validity of the research and its subsequent conclusions.

### Chapter Conclusion

The chosen research methodology was selected to facilitate finding an answer to the primary research question. By structuring the analysis of the research in a step-by-step manner, framed by the stated assumptions, limitations and delimitations, the research should clearly support the drawing of a logical and supportable conclusion. The literature review, operational approach, and evaluation criteria will help answer the secondary research questions, and the answer to these questions will shape the findings toward answering the primary research question, “should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa in order to promote regional stability and provide humanitarian aid?” The next chapter, chapter 4, contains the data collected and an analysis of the research.

## CHAPTER 4

### DATA PRESENTATION AND ANALYSIS

#### Chapter Introduction

The research data collected to answer the primary research question, “should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa in order to promote regional stability and provide humanitarian aid?” is presented in this chapter. The research methodology provided a framework for data collection and the secondary research questions shaped the course of the research. The resulting information is analyzed and presented using the five-step process and operational approach outlined in chapter 3.

#### Step 1: Results of the Literature Review

The review of literature examining the existing water scarcity challenges in West Africa indicated that water is intricately tied to regional stability. Research also showed that the USG is already involved in finding ways to mitigate the effects of water scarcity and encourage sustainable development. However, effective strategic planning requires the development of both short and long term goals to develop partnerships that have the capacity to successfully influence adverse conditions.

As a leading power in the international community, the USG can draw on several elements of soft and hard power to achieve its goals and protect its national interests. Cooperation and coordination between USG agencies, IGOs, and NGOs are key concepts supporting further development of viable water strategies in West Africa (U.S. Department of State 2010). Since governance is not a core mission of the DOD, it must

work with the DOS and USAID to accomplish its regional security and stability objectives. Operating in tandem with existing water scarcity programs in West Africa, both nationally and internationally, will give a sense of legitimacy to any U.S. intervention and make it less likely that a military presence will disrupt cooperative efforts.

From a military perspective, the DOD relies on AFRICOM to identify potential problems before they escalate into substantial crises or conflict (Schlegel and Talley 2008). AFRICOM is unique among the DOD's GCCs, as it is not designed to optimize the engagement of the USG or even that of any of the other departments of the federal government, such as the DOS. The DOD has recognized that its engagement in Africa is focused primarily on what the joint community refers to as 'Phase 0' activities. These include peacetime military engagement activities designed to establish conditions that support U.S. interests; namely, African states that are secure and stable in their domestic and international relations, promote free and fair participation in their political systems, promote economic growth, and provide greater distribution of economic gains throughout their societies (Schlegel and Talley 2008).

AFRICOM's 2017 Posture Statement focuses its command approach on developing a light, adaptable footprint that enables joint operations, protection of U.S. personnel and facilities, crisis response, and security cooperation. AFRICOM recognized that Africa is vulnerable to "conflict and instability from political, social, economic, and environmental challenges" (United States Africa Command 2017). The theater strategy goal is to establish a long-term, regionally-focused approach for a safe and stable Africa. Overarching objectives focus on building partner capacity to support African solutions to

African problems and to develop programs that address the root causes of instability through diplomacy and development partnerships.

Unfortunately, due to fluctuations in the size and budget of the AC and the sheer scope of AFRICOM's mission challenges, the DOD will need to find a way to leverage existing resources to support AFRICOM in meeting its objectives. One proposed solution is to employ the RC in accordance with the Army's Total Force Policy (Secretary of the Army 2012). By using a total force approach, the DOD and AFRICOM can take advantage of the distinctive structural and operational capabilities within the RC as a means to combat specific challenges in Africa.

RC forces are dedicated to supporting the strategic goals and interests of the GCCs as they promote regional stability, security, and global interdependence. In Africa, RC forces support AFRICOM to prevent, mitigate and manage conflict, and respond to natural disasters and humanitarian crises. Sustaining a balance requires extensive consideration of economic, social, and environmental concerns to avoid untoward second or third order effects. Partner engagement programs promote capacity building by providing essential resources, training, and support to African military forces. From a water security and availability standpoint, this increases their capability to support civilian authority and the development of water initiatives.

From a capability and partnership perspective, RC forces are an invaluable asset to the Total Force, providing a cost-effective organization that can be leveraged to provide strategic depth, operational forces, and institutional support (Department of Defense 2016).

Table 2. DOD Estimated Military Manpower by Service Component (in thousands)

<b>DOD Estimated Military Manpower by Service Component (in thousands)</b>				
<b><u>Army</u></b>	Active	National Guard	Reserve	Reserve Component (percent)
	460.0	335.0	195.0	53

*Source:* Modified from the original by the author from Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs. *Defense Manpower Requirements Report*. (Washington, DC: Department of Defense, 2016), accessed March 17, 2017, <http://prhome.defense.gov/Portals/52/Documents/RFM/TFPRQ/docs/FY16%20DMRR.PDF>.

The table above illustrates the manpower available within each Army component, with the RC making up a little over half of the total Army force structure. These forces are inter-reliant on each other, with each organization bringing its unique capabilities to bear to protect national interests and promote security and stability around the world.

Under the current military force structure, there are specific unit capabilities unique to each component that are indispensable to the effectiveness of the total operational force. The RC contains the majority of key support units and capabilities, such as medical, transportation, and engineering capabilities (U.S. Army Reserves 2017a).

AFRICOM's operational approach in West Africa focuses on disrupting and neutralizing transnational threats by building African partner defense capability to increase stability in the region. By developing RC partnerships through consistent, long-term engagement, AFRICOM can leverage the skills and resources of the RC not readily available in the active component, such as disaster response, consequence management, and border security capabilities (Army National Guard 2015). In the case of West Africa,

RC engagements can assist African military forces in supporting tailored water and sustainable development strategies in cooperation with their partnered nations.

AFRICOM's TCP strives to find ways to neutralize transnational threats, increase partner defense capabilities, and promote regional stability (United States Africa Command 2017). Both the RC and AFRICOM have worked hard to develop stable relationships with host countries that have demonstrated a willingness to engage in return (U.S. Africa Command 2017). AFRICOM can enhance these relationships by finding ways to determine the most advantageous allocation of resources using academia, embassies, international partners, regional partners, non-governmental organizations, and private corporations to increase the weight of designated efforts.

The literature review provided an overall understanding the security environment in West Africa and how water scarcity impacts political, social, and economic development. This information provided a direct answer to the initial secondary research question, "does water scarcity in West Africa present a reasonable security concern to the U.S. and require military intervention to alleviate any potential threat?" Based on AFRICOM's assessment of the conditions in West Africa, it can be determined that there is reasonable cause for U.S. military intervention in water security issues to alleviate any threats to peace and security.

### Step 2: Operational Approach

Alleviating water scarcity issues requires a multi-faceted approach to capacity building, strengthening government support, resourcing, and the development of technology and its various applications. The information gathered during the literature review allowed the researcher to apply Army Design Methodology to develop a viable

operational approach that would lead to the development of an answer to the stated primary research question. Based on this research, the researcher developed a desired end state based on AFRICOM's security objectives within areas that RC operations could be reasonably expected to influence.

Over the past sixteen years, the RC has been an invaluable asset to the DOD, providing unique skills and manpower to support combat, stability, and security missions around the world. The RC Soldier enhances defense capabilities by integrating civilian experience and technical expertise into military operations, which provides an immense amount of versatility to the RC. RC capability partnerships build friendships and interoperability, and ultimately have the potential to positively impact decision-making. While water scarcity may not be the direct cause of volatility in West Africa, identifying ways to alleviate the issue provides the U.S. with opportunities to protect its national interests, strengthen international partnerships, and enhance the ability of developing nations to provide humanitarian and civic assistance to their populations. A whole of government approach in West Africa is required to alleviate security concerns, such as governmental instability, inadequate infrastructure, and the expanding threat of VEOs.

Achieving sustainable development objectives is essential to alleviating water scarcity problems in West Africa. As discussed earlier, social, economic, and environmental conditions heavily impact the success of sustainable development solutions.

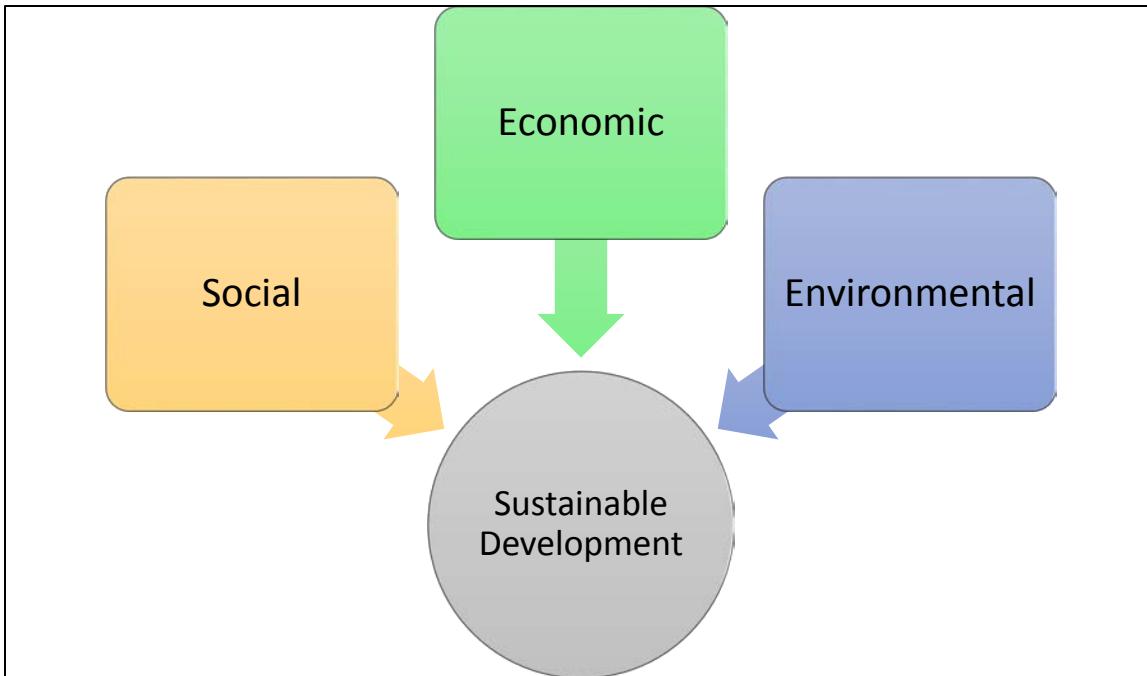


Figure 10. Sustainable Development Dimensions

*Source:* Developed by the author.

From a social perspective, water scarcity influences and is influenced by poverty and social inequity (United Nations World Water Assessment Programme 2015).

Economic development is a key element in mitigating water scarcity challenges.

Sustainable development strategies must integrate and enforce environmental protection plans to ensure that pollution and unsustainable water practices do not cause further deterioration of vital fresh water ecosystems (United Nations World Water Assessment Programme 2015).

HCA operations build partnerships; enhance military deterrent effects and increases situational awareness; and shapes the message of shared responsibility to alleviate human suffering and improve the human condition. To be effective, HCA

programs need the right people doing the right job with the right resources. Successfully combating water scarcity in West Africa requires interconnectedness, awareness, and an understanding of established goals and the desired end state. Any military-based intervention must be flexible and adaptable, leveraging relationships with global partners while balancing economic and security requirements. The U.S. must demonstrate a commitment to alleviating humanitarian suffering and improving the human condition. It must also work in tandem with forces that have genuine capabilities to expand water resourcing infrastructure and capacity in areas that are less developed. Leveraging RC resources can increase partner capacity building using skills and capabilities that already exist in the RC force structure.

Table 3. Army Component Capabilities by Percentage

Unit	AC	USAR	ARNG
Civil Affairs	23%	77%	0%
Engineers	23%	30%	47%
JAG	0%	94%	6%
Medical	25%	59%	16%
Military Police	31%	24%	45%
Transportation	18%	43%	39%

*Source:* Developed by the author.

It is imperative to understand the capabilities and limitations of the RC to ensure the organization is employed as designed. The RC operates at a different level of responsiveness for overseas deployments than the AC, primarily because they need a certain amount of time to meet readiness and deployment requirements (The Strategy Bridge 2016). Using RC forces must also take into account the social and economic impact of deployment on the U.S., as many members of the RC also have responsibilities in the civilian sector. Based on these constraints, determining what kind of overseas mission the RC can best support requires not only the implementation of the Army's Total Force Policy but the identification of suitable operational objectives and an actionable strategy for employment. Provided the legal, logistical, and economic considerations of deploying RC forces are met, the RC could be a useful asset to employ in support of AFRICOM and NA missions.

Two distinct RC programs that could aid in providing HCA support for water scarcity programs in West Africa are the USAR Private Public Partnership (P3) and the ARNG SPP. These programs provide specific capabilities and opportunities that could enhance the influence of the RC in supporting AFRICOM and the DOD.

The USAR P3 program seeks to connect Army Reserve Soldiers with increased training opportunities through cooperative programs with private employers. The P3 program enhances Soldier readiness and experience by tying in their civilian expertise to private sector resources (U.S. Army Reserve 2017b). Its end state is to maintain force readiness and enhance capabilities to support sustainment needs of the Army. P3s have been proven to be a successful infrastructure procurement approach for resource-constrained government agencies. The USAR adopted the P3 infrastructure procurement

approach to sustain individual and unit readiness. P3 uses private sector capital to fund Soldier training, obtain resources, and procure training venues. The program fosters relationships with private sectors to serve communities of USAR Soldiers (U.S. Army Reserve 2017b).

The DOD developed the ARNG SPP to aid Geographic Combatant Commands (GCCs) in achieving security cooperation objectives, using the U.S. Ambassadors' Integrated Country Strategies and State Department goals, and in support of the NSS and U.S. foreign policies (National Guard 2017). The SPP connects the U.S. with Soldiers from a partner country's military to build relationships and facilitate civil-military cooperation. These programs support the U.S. National Security Strategy and Department of Defense security objectives by increasing understanding between nations, enhancing interagency capabilities, and increasing capacity and stabilization across the globe (National Guard 2017). The SPP currently has 73 security partnerships with 79 countries around the world. According to the 2015 State Partnership Program Report to Congress, there are 12 SPP partnerships in the AFRICOM area of responsibility (AOR). During FY 2015, AFRICOM and the ARNG conducted a total of 107 activities at a total cost of \$2,079,663 (National Guard 2017). Based on the report, the ARNG supported programs involving medical response, engineering and logistics, cyber defense techniques and processes, and women's integration and gender issues.

## Risks

Water scarcity presents challenges in a myriad of areas and carries a variety of risks, both in the associated problems and their potential solutions. Water scarcity issues in West Africa impact health, education, governance, economy, and the environment. The

lack of clean water and proper sanitation can lead to an increased risk of disease and death. Water accessibility problems generate risks to agricultural growth, development, and industrialization, and can impact trade and business opportunities due to water shortages and pollution. Governments that struggle to provide basic needs to their population and cannot develop vital infrastructure are viewed as weak, creating opportunities for internal and external actors to manipulate politics.

Unfortunately, it is far too easy to generate short term solutions that result in the creation of long-term problems. For example, as urban water demands increase, individuals and organizations turn to engineering solutions to alleviate the pressure. However, many of these solutions cause second and third order effects that generate greater tensions. Diverting or transferring water from rivers may help certain communities and harm others, as the interconnected and transboundary nature of water resources in West Africa. Such measures threaten to raise tensions between organizations implementing these transfers and those harmed by them. Developing nations significant engineering efforts often harm the livelihoods of local populations, leading to increased poverty and food insecurity. They are expensive and degrade natural processes, such as water cleaning and flood and drought mitigation.

## Opportunities

Generating solutions to water scarcity challenges in West Africa requires an understanding of the current environment and the ability to create both short-term and long-term strategies. For decades, well-intentioned organizations have struggled to design and implement successful water projects in West Africa, only to find that their solutions could not overcome the challenging environmental, social, or economic conditions of

their host nations. U.S. DOD supported water scarcity programs must strive to recognize, incorporate, and enhance the skills of its West African partners. These multi-faceted programs must be capable of providing immediate aid where required, viable stopgap measures to prevent further deterioration of resources, and establishing long-term efforts to create sustainable African solutions to African problems.

From a U.S. perspective, NA and HCA missions can improve regional stability, which in turn increases economic, political, and social development. RC deployments to support water scarcity missions can be shaped to enhance civil-military interaction, promote good-will towards the U.S., and provide hands-on experience and training at the individual and collective level.

Each of the five major sections presented in Figure 11 below identifies an area that can be influenced to achieve sustainable development and successfully combat water scarcity in West Africa. Any NA program developed to mitigate the effects of water scarcity must include careful assessments that identify needs, assess vulnerabilities, and find ways to influence change.

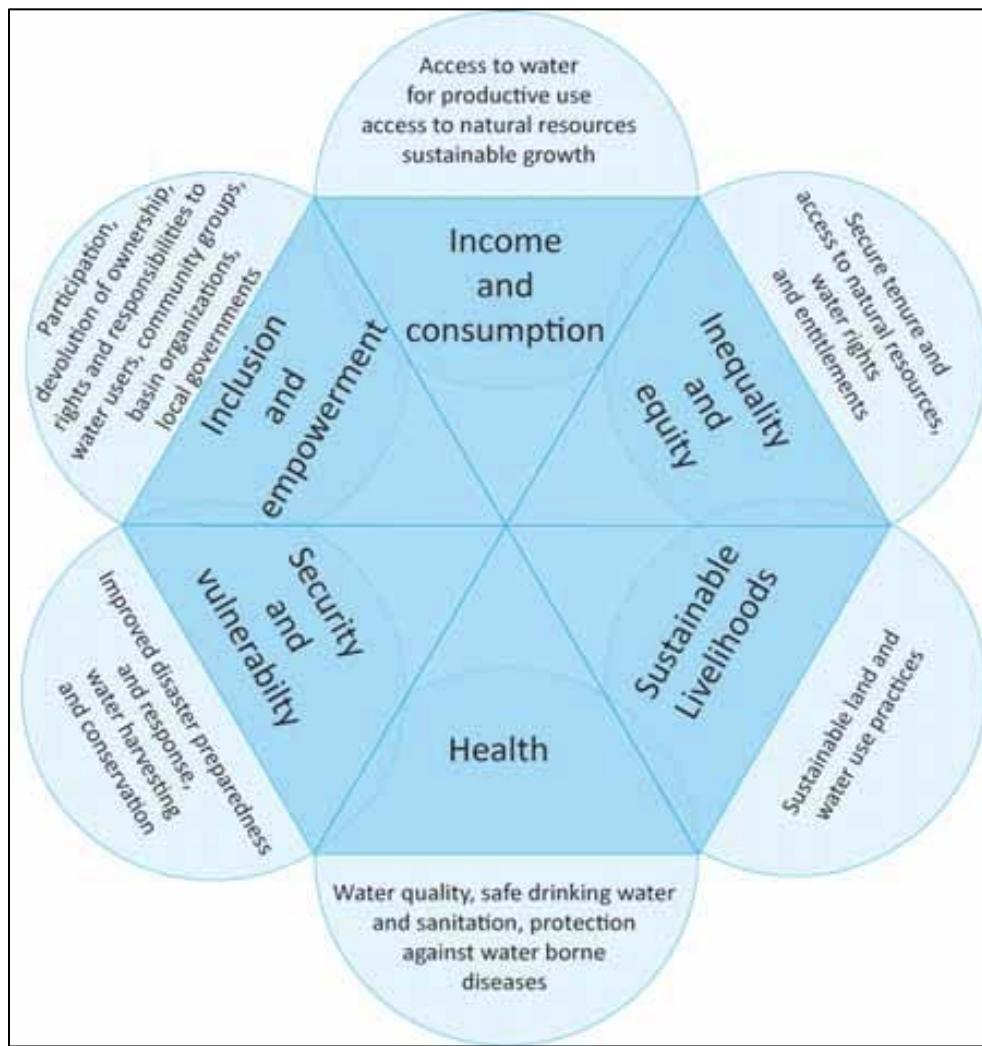


Figure 11. Link Between Poverty, Water, and the Environment

*Source:* United Nations Environment Programme, “Africa Water Atlas,” 2010, accessed March 15, 2017, [https://na.unep.net/atlas/africaWater/downloads/africa\\_water\\_atlas.pdf](https://na.unep.net/atlas/africaWater/downloads/africa_water_atlas.pdf).

UN-Water recommended five target areas to influence sustainable development and combat water scarcity. Nesting these targeted areas with AFRICOM’s fifth LOE, build African peacekeeping, humanitarian assistance, and disaster response capacity, provides a solid foundation for future RC water scarcity missions (U.S. Africa Command 2017).

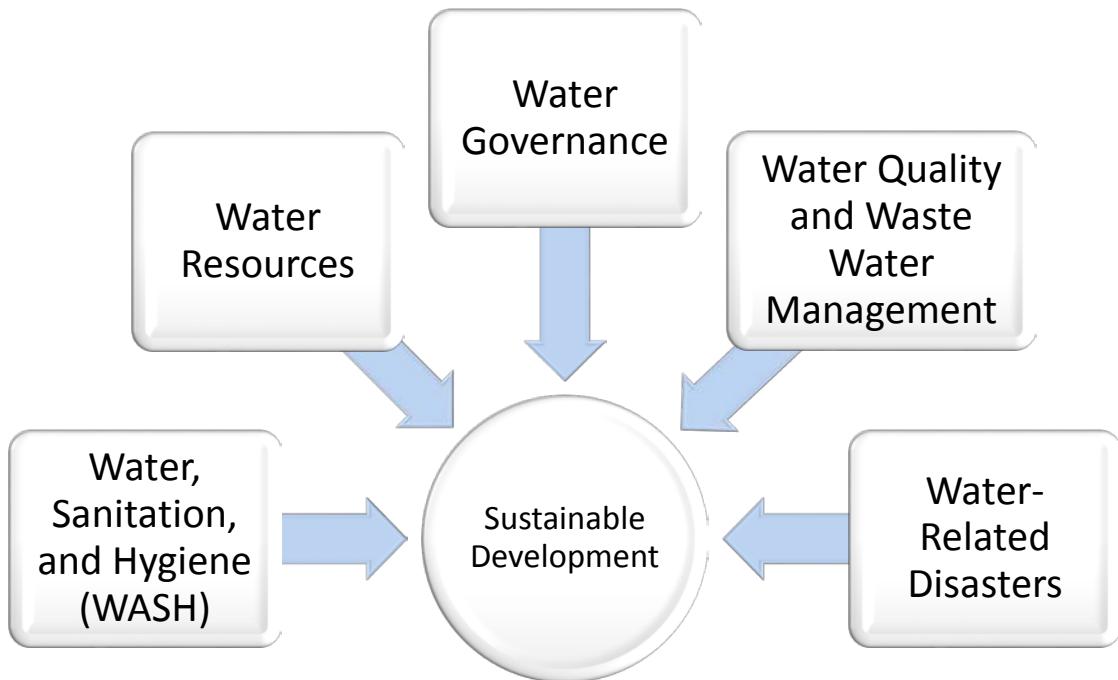


Figure 12. Water Scarcity Targets

*Source:* Developed by the author.

Over the next ten years, RC forces can be leveraged to support small scale water scarcity operations targeting the five areas pictured above. Impacts can be made in the areas of improved water management solutions, targeted health and sanitation initiatives, and sustainable development practices.

### Step 3: Application of the Evaluation Criteria

As described in chapter 3, the evaluation criteria used to provide a framework to measure the validity of a particular course of action. The three evaluation criteria, relevance, efficiency, and impact, will be analyzed in conjunction with the three remaining secondary questions, data from the literature review, and the researcher's

knowledge of the subject matter. The conclusions drawn using the evaluation criteria will aid in answering the primary research question.

The first area to be evaluated is in regards to relevance. This criterion aligns with the secondary research question, “are the expectations for RC involvement consistent with U.S. Government authorizations, policies, and directives for an acceptable employment of the force?”

Table 4. Evaluation Criteria - Relevance			
	-	O	+
1) Relevance		O	

*Source:* Developed by the author.

Based on a review of U.S. strategic direction documents and analysis against the stated evaluation criteria of relevance, employing the RC to support security cooperation (SC) operations and provide humanitarian aid is in keeping with U.S. national interests. However, since there are several U.S. agencies and organizations that are better suited to developing long-term strategies to mitigate water scarcity issues in West Africa, the DOD should take a supporting role. This approach consistent with employing the unique capabilities of the RC to support water scarcity operations. Select, small-scale operations that can be supported by a sustained RC partnership can aid in solidifying relationships, building partner capacity, and demonstrating a willingness to support and shape

sustainable development in West Africa without leaving a large military presence in the region.

The second area to be evaluated is efficiency, which aligns with the secondary research question, “does the RC have the technical capabilities to provide HCA to alleviate water scarcity and shape the strategic environment in West Africa?”

Table 5. Evaluation Criteria – Efficiency			
	-	O	+
2) Efficiency			+

*Source:* Developed by the author.

The RC is a valuable asset to the U.S. military, yet its capabilities and technical skills have not been used to their fullest potential in West Africa. As part-time members of the military, RC Soldiers usually have increased experience and proficiency interacting with the civilian sector. Their technical skills may be more developed outside of the military, as they are not dependent on military funding and systems for training. RC members also tend to have an increased willingness to look outside of standard military responses to find solutions that integrate civilian, military, and inter-agency expertise. From an efficiency standpoint, the deploying in support of water scarcity missions in West Africa is beneficial to the RC and to the population of West Africa. RC forces are given the opportunity to receive relevant training, practice vital skills, and employ their critical technical expertise to aid a vulnerable population and enhance the capabilities of their supporting organizations.

The final secondary question, “should the militarization of development assistance be avoided?,” nests with the third evaluation criteria, impact.

Table 6. Evaluation Criteria - Impact			
	-	O	+
3) Impact			+

*Source:* Developed by the author.

The RC could provide NA in the form of HCA, targeting the five areas recommended by UN-Water: WASH, Water Resources, Water Governance, Water Quality and Waste Water Management, and Water Related Disasters. Improving sustainable agricultural practices, building capacity in cross-border resource management, and enhancing the functionality of programs already in existence may reduce some of the strain on a limited resource. In this case, RC involvement in NA and HCA operations conducted through BPC, DE, and the development of regional partnerships could have a positive and sustained impact on water scarcity in West Africa.

#### Step 4: Aggregation of the Findings

Table 7. Evaluation Criteria - Aggregate			
	-	0	+
1) Relevance			
2) Efficiency			
3) Impact			

*Source:* Developed by the author.

Answers to the secondary research questions discussed above are determined by aggregating the research findings. Based on the information collected for this study, water scarcity in West Africa influences regional stability, presenting a reasonable security concern to the U.S. While there are other USG agencies that are more suitable for spearheading water scarcity projects, leveraging military assets to relieve water scarcity pressures in specific areas to decrease threats to the region should be developed as viable options.

The current U.S. national security strategies, policies, and objectives all focus on achieving regional stability, deterring conflict, and preventing human suffering on a global scale. Africa is directly named as a strategic interest and investing in Africa's economic, agricultural, health, governance, and security capacities are specifically mentioned as priorities (National Security Council 2015). Broadly, U.S. interests in Africa relate to promoting security in the region by stabilizing fragile states; building partner capacity in the areas of peacekeeping and humanitarian aid; neutralizing the

terrorist threat; protecting strategic resources; and balancing China's growing role on the continent.

The U.S. does not want a large footprint of military forces in West Africa conducting operations and supporting ineffective and unwieldy, long-term humanitarian aid projects. However, AFRICOM could strategically influence the three dimensions of sustainability using RC forces to combat water scarcity in West Africa, which would contribute to regional security and stability. The RC maintains unique capabilities that do not exist in the AC. These technical skills can be leveraged to effectively provide HCA to alleviate and mitigate water scarcity challenges and shape the strategic environment in West Africa.

Members of the USAR and ARNG have expertise that can be leveraged to mitigate the current effects of water scarcity in West Africa. Building partnerships between the RC and West African nations to combat water scarcity will increase access to technological advances, distribute the cost of programs, make vital connections between civilian and military organizations, and aid in developing long term stability. However, there are valid reasons why the military should not spearhead development assistance projects in West Africa. These reasons range from legal restrictions on the use of military force in foreign nations to economic and budgetary restrictions. The militarization of development assistance to alleviate water scarcity should be avoided

#### Step 5: Conclusions and Recommendations

Finally, the last step in the research design is to draw conclusions and make recommendations for decision makers and for future research. This is found in chapter 5.

### Chapter Conclusion

Africa is widely acknowledged as the world's poorest and least developed continent. Millions of people in West Africa suffer water shortages throughout the year. There are significant linkages between water, the environment, and poverty, which provide opportunities for the U.S. to support water programs that increase stability and decrease human suffering. It also creates openings to influence gender equality, as women and girls are instrumental in providing water for their families. African women often perform between 65 and 72 percent of water collection duties (Intelligence Community Assessment 2012). Increasing water accessibility can have a substantial impact on the role that women play in West African society and increase educational opportunities.

## CHAPTER 5

### CONCLUSIONS AND RECOMMENDATIONS

#### Chapter Introduction

As the analysis has shown, the RC contains vital capabilities that can be selectively employed to support specific missions that will enhance the effectiveness of the Total Force and protect U.S. national interests abroad. Based on an understanding of the need for water security assistance in West Africa, the unique technical skills of the RC, and its ability to build long-term relationships with its foreign partners, the simple answer to the primary research question, “should the DOD leverage existing RC programs over the next ten years to address water scarcity issues in West Africa to promote regional stability and provide humanitarian aid?” is yes. However, through extensive study of the issues surrounding West Africa’s water scarcity challenges, there is a caveat to that answer. The RC is a valuable tool of the DOD, but it must be used in coordination with other USG agencies, IGOs, and NGOs to ensure that the militarization of humanitarian assistance is avoided. The RC should not be the lead force combating water scarcity, and neither should the DOD. To achieve sustainable development, any effective water scarcity plan must incorporate a whole of government approach that builds partner capacity, enhances host nation capabilities, and is supported by the will of the West African population.

Water scarcity problems are not simply a result of geography in West Africa. Population growth, rapid urbanization, poor infrastructure planning, and poverty are significant factors that influence the physical and economic availability of clean water. Increases in access to improved drinking water sources and sanitation facilities are not

keeping pace with population growth. Since Africa remains an enduring interest of the U.S., it is logical to conclude that operations will continue to affect all areas of government and require cooperative efforts to combat regional instability.

Chapter 5 is separated into three sections: 1) a brief summary of the findings from chapter 4 based on analysis against the stated evaluation criteria; 2) unexpected findings throughout the research; and 3) recommendations for decision-makers and for areas of future study.

### Conclusions

There are many contributing factors to the water scarcity issue in West Africa that must be addressed in order to balance the needs of an expanding population against the available resources. Stabilizing the region requires a multi-pronged approach that provides humanitarian aid, builds partner capacity, and neutralizes potential causes of conflict. Increasing water availability is paramount and the infrastructure and government must be developed in order to support its populace. The following conclusions were drawn after conducting research and analysis:

1. Water scarcity programs in West Africa are essential to shaping the current and future strategic environment of the region.
2. Water scarcity operations that leverage RC partnerships are a low-cost investment that pays big dividends by aiding in increased regional stability, the prevention of failed states.
3. Funding is a critical factor in resourcing and maintaining the capabilities of water scarcity programs.
4. RC forces conducting HCA builds partnerships, enhance military deterrent

effects, increase situational awareness, and shapes the message of the shared responsibility to alleviate human suffering and improve the human condition.

The results of this study show that NA and HCA programs are opportunities for the RC to develop beneficial long-term relationships that allow them to enhance their technical training and experience while leveraging vital capabilities unique to the RC to provide aid to foreign countries. Combating water scarcity is a prime example of an HCA mission can be effectively be assumed by the RC on a limited scale, if managed appropriately. Shaping HCA activities is vital to achieving any kind of measurable success.

The unique nature of the RC lends itself to providing long-term assistance towards combating water scarcity. The U.S. military is not authorized to undertake long-term FHA missions, as there must be a definitive end to military operations, according to JP 3-29. However, military units can provide NA and HCA in support of DOS and USAID operations. RC capabilities can be effectively leveraged to aid in BPC and DE, as well as providing necessary skills to promote sustainable development over the next ten years. Expanding RC partnerships to include inter-agency, private and public sectors, and non-profit entities are likely to increase cost-sharing, enhance operational experience, and create a unity of effort in addressing water challenges across West Africa.

These partnerships are not only beneficial to West Africa, but to the development of relationships between the AC and the RC, as evidenced by the Ebola crisis in West Africa in 2014 (Army National Guard 2015). The ARNG SPP had previously established partnerships with six nations in West Africa. The result of this interaction was trust between organizations, increased partner capacity, and the identification of areas that

could be influenced to improve conditions and capabilities in within their host nations. When these nations faced a devastating outbreak of disease, it was that partnership, those relationships, that guided U.S. intervention and assistance. AC commanders lauded the ARNG SPP and the situational awareness and regional understanding the program was able to provide to incoming units (Army National Guard 2015).

Determining where to apply assets in West Africa to combat water scarcity is challenging. As previously discussed, there are a multitude of organizations and stakeholders in that have a vested interest in the region that make choosing an approach that satisfies the needs of every organization is daunting. RC water scarcity programs must be developed in alignment with the goals of U.S. Ambassadors and organizations like the USAID, DOS, and DOD. It is also imperative that the needs of the West African population are integrated into the choice of projects. Without the will of the people, externally developed water projects will never be sustainable.

There are three basic areas that require considerable analysis to successfully leverage RC capabilities to combat water scarcity. First, project selection is critical. There are so many variables that affect water scarcity that selecting the most advantageous area to focus on is vital to project viability. Appropriate project evaluation criteria must be established to not only ensure the finished project will fill the required need, but that it provides the desired long-term benefits.

Project sustainability is the second area that must be considered. As discussed previously, water scarcity intervention must include sustainable development planning. Sustainability requires coordination between the West African population IGOs, NGOs,

and the military to ensure that water scarcity projects are enhanced by strong, positive relationships and supported by the cooperative efforts of a multi-organizational approach.

These cooperative efforts will aid in providing information for the continual assessment of each project and its impact on the region. Since West Africa is a dynamic environment, the reevaluation of project requirements and effectiveness through assessment is imperative. RC units will be able to sustain relationships with project areas long after the initial work of the project is complete, which will encourage a deeper understanding of the operational environment and build a lasting connection with the nations it is assisting.

#### Unexpected Findings

The researcher initially expected to find several USAR P3 program development efforts in West Africa. However, despite the potential of USAR P3 programs, evidence showed that there are currently no USAR P3 programs on the African continent. Other USG agencies, like the DOS and USAID, have developed cooperative programs that encourage resource sharing between the private and public sectors to aid in achieving the desired results. However, the integration of military, public, and private sector resources offers beneficial opportunities for the U.S. in combating water scarcity issues in West Africa.

### Recommendations



Figure 13. RC HCA Operational Goals

*Source:* Developed by the author.

### Recommendations for decision-makers

As depicted above, this study has outlined ways that the RC can be leveraged to aid the DOD and AFRICOM in conducting HCA operations to combat water scarcity issues in West Africa. Employing the RC in accordance with the Total Force Policy and Regionally Aligned Forces (RAF) concept will increase interoperability and build

readiness. RC units bring vital capabilities to aid AFRICOM in conducting HCA operations that focus on alleviating water scarcity issues in West Africa. By operating in the region, the RC builds an understanding of the regional threats, including competition for resources; infrastructure, environmental, and socio-economic challenges; and neutralizing the development and impact of VEOs. This understanding aids in the development of regional partnerships, enhancement of interdependent capabilities, and the identification of capability gaps.

The importance of understanding how to effectively leverage the capabilities of the RC cannot be understated. Over the past 16 years, the RC has demonstrated its ability to support the AC during combat operations. However, how to appropriately integrate the RC into strategic and operational planning for non-combat operations remains a challenge. To effectively employ RC forces, the DOD must educate leaders about the RC and how best to take advantage of its unique capabilities. The addition of a block of instruction within the Joint Professional Military Education, preferably at the CGSC level, that focuses on the RC would pay enormous dividends to the military community.

#### Recommendations for future research

This study broadly determined that the DOD should leverage the RC to combat water scarcity in West Africa, but was not designed to delve deeply into how specific RC capabilities can be best employed in the region. Additional research should be conducted to determine how unique RC units, such as Civil Affairs, can be integrated into water projects and how to use RC water development programs as a platform for change in the areas of human rights, education, and gender equality.

The research also highlighted two existing RC programs that could potentially provide structure to HCA activities in West Africa that require further study. The ARNG's SPP has already demonstrated that it is effective in establishing worthwhile relationships that have effectively provided humanitarian aid. Although the USAR's P3 program does not currently have operations in Africa, there are expansive opportunities to research how to link RC forces with private and public organizations to accomplish specified tasks. Future researchers can examine the capabilities of the ARNG SPP and USAR P3 programs to determine ways to further integrate them into plans to mitigate water scarcity challenges in West Africa.

Additional research should also be conducted on how the integration of the RC into water scarcity operations would impact and be impacted by key regional stakeholders. Specifically, the involvement of China and its military in West Africa provides program development opportunities and challenges that would benefit from further study.

### Final Thoughts

Successfully overcoming water scarcity challenges in West Africa requires partnerships at the local, regional, and international levels. Local leaders must have trust in the foreign aid coming into their villages and their homes if they are to adopt programs, accept technology, or implement changes into their society. When leaders know what organizations to look to, when they realize that promises will be kept and support will be maintained in the long-term, they are more likely to accept assistance.

The RC is a unique asset, combining the military skills of the Soldier with the technical savvy of the Civilian. Leveraging RC forces has the advantage of strengthening

the Total Force Concept by building an understanding of force capabilities, enhancing AC and RC capacity and interoperability, and developing cooperative relationships with strategic partners. The capability is currently under used in West Africa.

## REFERENCE LIST

Addo, Jonathan. 2003. "The Impact of Globalization on African Conflicts." Master's Thesis, Command and General Staff College, Fort Leavenworth, KS.

Army National Guard. 2015. *State Partnership Program FY 2015 Report to Congress*. Washington, DC: National Guard Bureau.

Agyapong, William. 2005. "Military Intervention in Instrastate Conflicts in West Africa: Economic Community of West African States Monitoring Group as a Case Study." Master's Thesis, Command and General Staff College, Fort Leavenworth, KS.

Centre for Ecocology and Hydrology. 2017. "Using the Water Poverty Index to Monitor Progress in the Water Sector." CEH Wallingford. Accessed March 15, 2017. [http://portals.wi.wur.nl/files/docs/ppme/Water\\_poverty\\_index.pdf](http://portals.wi.wur.nl/files/docs/ppme/Water_poverty_index.pdf).

Chairman of the Joint Chiefs of Staff. 2015. *National Military Strategy*. Washington, DC: Department of Defense.

Danish Institute for International Studies. 2004. "From Waterwars to Waterriots: Lessons from Transboundary Management." Danish Institute for International Studies, Copenhagen.

Department of Defense. ——. 2017. *DOD Dictionary of Military and Associated Terms*. Washington, DC: Department of Defense.

———. 2016. *The 2016 Posture of the United States Army Reserve: A Global Operational Reserve Force*. Washington, DC: Department of Defense.

———. 2015. *The National Military Strategy of the United States of America*. Washington, DC: Department of Defense.

———. 2014. Department of Defense Instruction 2205.02, *Humanitarian and Civic Assistance (HCA) Activities*. Washington, DC: Department of Defense.

———. 2012. *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*. Washington, DC: Department of Defense.

———. 2008. *Managing the Reserve Components as an Operational Force*. Washington, DC: Department of Defense.

Department of the Army. 2015. Department of the Army Pamphlet 11-31, *Army Security Cooperation Handbook*. Washington, DC: Department of the Army.

Easterly, William. 2008. "Can the West Save Africa?" *Global Economy and Development* (October): 1-84.

Economic Community of West African States. 2017. "Economic Community of West African States (ECOWAS)." Accessed February 23, 2017. <http://www.ecowas.int/about-ecowas/basic-information/>.

European Environment Agency. 2017. "Water Stress." Accessed March 15, 2017. <https://www.eea.europa.eu/themes/water/wise-help-centre/glossary-definitions/water-stress>.

Fund for Peace. 2017. "Fragile States Heat Map." Accessed February 24, 2017. <http://fundforpeace.org/fsi/analytic/fsi-heat-map/>.

Global Water Partnership. 2017. "GWP in Action-West Africa." Accessed February 24, 2017. <http://www.gwp.org/en/gwp-in-action/West-Africa/>.

Houdret, Annabelle, and Miriam Shabafrouz. 2006. *Privatisation in Deep Water? Water Governance for Development Cooperation*. Duisburg: Institute for Development and Peace.

Intelligence Community Assessment. 2012. "Global Water Security." February 2. Accessed March 15, 2017. [https://www.dni.gov/files/documents/Special%20Report\\_ICA%20Global%20Water%20Security.pdf](https://www.dni.gov/files/documents/Special%20Report_ICA%20Global%20Water%20Security.pdf).

Jansen, John J. 2010. "National Guard State Partnership Program: A Whole-of-Government Approach." Strategy Research Project, U.S. Army War College, Carlisle, PA.

Joint Chiefs of Staff. 2016. Joint Publication 3-08, *Interorganizational Coordination During Joint Operations*. Washington, DC: Department of Defense.

———. 2014. Joint Publication 3-29, *Foreign Humanitarian Assistance*. Washington, DC: Department of Defense.

Kem, Jack D. 2012. *Planning for Action: Campaign Concepts and Tools*. Fort Leavenworth, KS: U.S. Army Command and General Staff College.

Krabacher, Thomas, Azzedine Layachi, and Ezekiel Kalipeni. 2009. *Global Studies: Africa*. New York: McGraw-Hill.

Leedy, Paul D., and Jeanne Ellis Ormrod. 2005. *Practical Research*. Upper Saddle River, NJ: Pearson Education.

Millenium Development Goals. 2015. *MDG Report 2015: Assessing Progress in Africa Toward the Millenium Development Goals*. Addis Ababa: United Nations Economic Commision for Africa.

National Guard. 2017. "State Partnership Program." Accessed February 24, 2017. <http://www.nationalguard.mil/Leadership/Joint-Staff/J-5/International-Affairs-Division/State-Partnership-Program/>.

National Security Council. 2015. *National Security Strategy*. Washington, DC: The White House.

Office of the Assistant Secretary of Defense for Manpower and Reserve Affairs. 2016. *Defense Manpower Requirements Report*. Washington, DC: Department of Defense. Accessed March 17, 2017. <http://prhome.defense.gov/Portals/52/Documents/RFM/TFPRQ/docs/FY16%20DMRR.PDF>.

Otieno, Janet. 2013. "Understanding Africa's Water Wars." *Africa Review*, November 6. Accessed March 15, 2017. <http://www.africareview.com/special-reports/Understanding-the-water-wars-in-Africa/979182-2062968-140f6dk/>.

Padowski, J. C., and J. W. Jawitz. 2009. "The Future of Global Water Scarcity: Policy and Management Challenges and Opportunities." *The Whitehead Journal of Diplomacy and International Relations* (Summer/Fall). Accessed March 17, 2017. <http://www.journalofdiplomacy.org>.

Prüss-Üstün, Annette, Robert Bos, Fiona Gore, and Jamie Bartram. 2008. *Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health*. Geneva: World Health Organization.

Schlegel, Charles F., and Thomas F. Talley. 2008. "AFRICOM's Regional Engagement: Designing the Right Mix of Authorities, Resources, and Personnel." *American Diplomacy*. May. Accessed May 15, 2017. [http://www.unc.edu/depts/diplomat/item/2008/0406/comm/schlegel\\_africom.html](http://www.unc.edu/depts/diplomat/item/2008/0406/comm/schlegel_africom.html).

Schulte, Peter. 2014. "Defining Water Scarcity, Water Stress, and Water Risk: It's Not Just Semantics." Pacific Institute Insights. February 4. Accessed February 23, 2017. <http://pacinst.org/water-definitions/>.

Secretary of the Army. 2012. Army Directive 2012-08, *Army Total Force Policy*. Washington, DC: Department of the Army. Accessed March 15, 2017. [http://www.apd.army.mil/epubs/DR\\_pubs/DR\\_a/pdf/web/ad2012\\_08.pdf](http://www.apd.army.mil/epubs/DR_pubs/DR_a/pdf/web/ad2012_08.pdf).

Shomento, William A. 2014. *Leveraging the National Guard to Build Partner Capacity*. Carlisle, PA: U.S. Army War College.

Sphere Project. 2017. *The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response*. Accessed March 17, 2017. <http://www.spherehandbook.org>

The Strategy Bridge. 2016. "Army Total Force Policy: Implementation Challenges." June 30. Accessed March 15, 2017. <http://www.thestrategybridge.org>.

UN Water. 2017. "UN Water." Accessed March 15, 2017. <http://www.unwater.org>.

United Nations. 2013. "Water Security." Accessed March 15, 2017. <http://www.unwater.org/topics/water-security/en/>.

United Nations Economic Commission for Africa. 2017. "UNECA." Accessed March 15, 2017. <http://www.uneca.org>.

United Nations Environment Programme. 2010. *Africa Water Atlas*. Accessed March 15, 2017. [https://na.unep.net/atlas/africaWater/downloads/africa\\_water\\_atlas.pdf](https://na.unep.net/atlas/africaWater/downloads/africa_water_atlas.pdf).

United Nations World Water Assessment Programme. 2015. *The United Nations World Water Development Report 2015: Water for a Sustainable World*. Paris: UNESCO.

U.S. Agency for International Development. 2017. "Lake Chad Basin." Accessed February 23, 2017. <https://www.usaid.gov/crisis/lake-chad>.

U. S. Africa Command. 2017. *United States Africa Command 2017 Posture Statement*. Washington, DC: Department of Defense.

U.S. Army Reserve. 2017a. "Army Reserve: Indispensable Capabilities for the Operational Force." Accessed February 23, 2017. <http://www.usar.army.mil/Portals/98/Documents/infographics/MOS%20Breakdown.pdf>.

———. 2017b. "Private Public Partnership." Accessed February 23, 2017. <http://www.usar.army.mil/Featured/Private-Public-Partnership/>.

U.S. Department of State. 2015. *Quadrennial Diplomacy and Development Review: Enduring Leadership in a Dynamic World*. Washington, DC: Department of State.

———. 2010. *Senator Paul Simon Water for the Poor Act Report to Congress*. Washington, DC: Department of State.

U.S. Geological Survey. 2017. "West Africa: Land Use and Land Cover Dynamics." Accessed March 15, 2017. <https://eros.usgs.gov/westafrica/land-cover/land-use-and-land-cover-trends-west-africa>.

U.S. Water Partnership. 2017. "U.S. Water Partnership." Accessed March 17, 2017. <http://www.uswaterpartnership.org>.

USAID. 2016. "West Africa Water Supply, Sanitation, and Hygiene Program." Accessed March 15, 2017. <http://www.usaid.gov/west-africa-regional>.

USAID West Africa. 2015. *Regional Development Cooperation Strategy: 2015-2019*. United States Agency for International Development.

The Water Project. 2017. "Water Scarcity." Accessed March 15, 2017.  
<https://thewaterproject.org/water-scarcity/>.

Weiss, Edith B. 2014. "International Law for a Water-Scarce World." *The European Journal of International Law* 25, no. 3: 935-957.

West African Environmental Studies. 2017. "Water." Accessed February 24, 2017.  
<http://blogs.nelson.wisc.edu/es112-311-4/water/>.

White, Chris. 2012. GWF Discussion Paper 1217, "Understanding Water Scarcity: Definitions and Measurements." Global Water Forum, Canberra:

Wolf, Aaron T., Annika Kramer, Alexander Carius, and Geoffrey D Dabelko. 2006. "Navigating Peace: Water can be a Pathway to Peace, Not War." Environmental Change and Security Program. Accessed March 15, 2017.  
<https://www.wilsoncenter.org/sites/default/files/NavigatingPeaceIssue1.pdf>